

## BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Kudo, Hiroyuki	POSITION TITLE Professor, Faculty of Engineering, Information and Systems, University of Tsukuba Editor in Chief, Journal "Medical Imaging Technology"		
eRA COMMONS USER NAME			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Tohoku University, Sendai, Japan	B.Sc.	1985	ELECTRICAL ENG.
Tohoku University, Sendai, Japan	M.Sc.	1987	ELECTRICAL ENG.
Tohoku University, Sendai, Japan	Ph.D.	1990	ELECTRICAL ENG.

### A. Professional experience

#### Positions and employment

1990-1992 Assistant Professor, Tohoku University, Sendai, Japan  
1992-1995 Full-Time Lecturer, University of Tsukuba, Tsukuba, Japan  
1995-2009 Associate Professor, University of Tsukuba, Tsukuba, Japan  
2009-present Professor, University of Tsukuba, Tsukuba, Japan  
2011-present Editor in Chief, Journal "Medical Imaging Technology"  
2015- present Vice President, JAMIT (Japanese Society of Medical Imaging Technology)

#### Professional services and other experience

1997-1998 *Visiting Scientist*, Division of Nuclear Medicine, Free University of Brussels, Belgium  
2000-2003 *International Advisory Board*, Journal "Physics in Medicine and Biology" (IOP Publishing)  
2000-2008 *Associate Editor*, Journal "Medical Imaging Technology"  
2009-present *Board of Directors*, Japanese Society of Medical Imaging Technology  
2011-present *Editor in Chief*, Journal "Medical Imaging Technology"  
2015- present Vice President, JAMIT (Japanese Society of Medical Imaging Technology)  
1995 *Scientific Committee*, 1995 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
1997 *Scientific Committee*, 1997 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
2000 *Program Committee*, 2000 IEEE Medical Imaging Conference  
2001 *Scientific committee*, 2001 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
2001 *Program Committee*, 2001 IEEE Medical Imaging Conference  
2002 *Program Committee*, 2002 IEEE Medical Imaging Conference  
2003 *Scientific Committee*, 2003 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
2003 *Program Committee*, 2003 IEEE Medical Imaging Conference  
2004 *Program Committee*, 2004 IEEE Medical Imaging Conference  
2005 *Chair*, 2005 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
2005 *Program Committee*, 2005 IEEE Medical Imaging Conference  
2006 *Guest Editor*, IEEE Transaction on Medical Imaging (Special Issue on Fully 3-D Image Reconstruction)  
2007 *Scientific Committee*, 2007 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
2007 *Program Committee*, 2007 IEEE Medical Imaging Conference  
2008 *Program Committee*, 2008 IEEE Medical Imaging Conference  
2009 *Program Committee*, International Forum of Medical Imaging in Asia 2009  
2009 *Scientific Committee*, 10-th Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine  
2009 *Program Committee*, 2009 IEEE Medical Imaging Conference  
2010 *Scientific Committee*, The 1-st international meeting on image formation in x-ray computed tomography  
2010 *Program Committee*, 2010 IEEE Medical Imaging Conference  
2011 *Program Committee*, International Forum of Medical Imaging in Asia 2011

Principal Investigator/Program Director (Last, First, Middle):

- 2011 *Scientific Committee*, 11-th Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine
- 2011 *Program Committee*, 2011 IEEE Medical Imaging Conference
- 2012 *Scientific Committee*, The 2-nd international meeting on image formation in x-ray computed tomography
- 2012 *Program Committee*, 2012 IEEE Medical Imaging Conference
- 2012 *Program Committee*, International Forum of Medical Imaging in Asia 2012
- 2013 *Scientific Committee*, 2013 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine
- 2013 *Program Committee*, 2013 IEEE Medical Imaging Conference
- 2014 *Scientific Committee*, The 3-rd international meeting on image formation in x-ray computed tomography
- 2014 *Program Committee*, 2014 IEEE Medical Imaging Conference
- 2015 *Program Committee*, International Forum of Medical Imaging in Asia 2015
- 2015 *Scientific Committee*, 2015 Fully 3-D Image Reconstruction in Radiology and Nuclear Medicine
- 2015 *Program Committee*, 2015 IEEE Medical Imaging Conference
- 2016 *Scientific Committee*, The 4th international meeting on image formation in x-ray computed tomography
- 2016 *Program Committee*, 2016 IEEE Medical Imaging Conference
- 2016 *Program Committee*, International Forum of Medical Imaging in Asia 2017

### **Professional memberships**

*Member.* IEEE, SIAM

*Vice President.* JAMIT (Japanese Society of Medical Imaging Technology)

*Fellow.* IEICE (The Institute of Electronics, Information, and Communications Engineers)

### **B. Awards and honors**

- 1990 Best Paper Award, The Institute of Electronics, Information, and Communications Engineers
- 1991 Niwa Memorial Award, Tokyo Denki University
- 1991 Best Presentation Award, Japanese Society of Medical Imaging Technology
- 1992 Best Paper Award, Japanese Society of Medical Imaging Technology
- 2002 Best Paper Award, Japanese Society of Medical Imaging Technology
- 2007 Best Paper Award, Japanese Society of Medical Imaging Technology
- 2007 2006 High Lights of International Journal "Inverse Problems" (IOP Publishing)
- 2009 2008 High Lights of International Journal "Physics in Medicine and Biology" (IOP Publishing)
- 2009 2008 High Lights of International Journal "Inverse Problems" (IOP Publishing)
- 2009 Best Paper Award, Japanese Society of Medical Imaging Technology
- 2009 Premium Poster, 2009 IEEE Medical Imaging Conference
- 2014 Best Conference Paper Award of Japanese Society of Computer Aided Surgery
- 2014 Top 30 Cited Papers of International Journal "Inverse Problems" (IOP Publishing)
- 2014 Fellow of IEICE (The Institute of Electronics, Information, and Communications Engineers) by the "Pioneering research achievements on cross-sectional image reconstruction methods in medical computed tomography"

(Awards to Lab's Students)

- 1996 *Noriko Miyagi*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2002 *Meihua Li*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2005 *Yuri Mameuda*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2008 *Essam A. Rashed*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2008 *Kyohei Yamamori*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2008 *Motonari Mori*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2009 *Tetsuya Kobayashi*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2012 *Zhen Wang*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2012 *Kazuaki Takahashi*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2012 *Essam A. Rashed*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2013 *Takahiro Tayama*, Best Presentation Award, Japanese Society of Medical Imaging Technology
- 2015 *Fukashi Yamazaki*, Best Presentation Award, IEICE (The Institute of Electronics, Information, and Communications Engineers)
- 2016 *Ryuuya Yasuda*, Best Presentation Award, Institute of Image Information and Television Engineers
- 2016 *Yuuki Hayakawa*, Best Presentation Award, Institute of Image Information and Television Engineers

**C. Peer-reviewed publications (in chronological order, domestic papers are NOT included, conference papers are NOT included)**

1. "Feasible cone beam scanning methods for exact reconstruction in three-dimensional tomography" Hiroyuki Kudo and Tsuneo Saito, Journal of the Optical Society of America A, Vol.7, No.12, pp.2169-2183 (1990)
2. "Sinogram recovery with the method of convex projections for limited-data reconstruction in computed tomography" Hiroyuki Kudo and Tsuneo Saito, Journal of the Optical Society of America A, Vol.8, No.7, pp.1148-1160 (1991)
3. "Derivation and implementation of a cone-beam reconstruction algorithm for nonplanar orbits" Hiroyuki Kudo and Tsuneo Saito, IEEE Transactions on Medical Imaging, Vol.13, No.1, pp.196-211 (1994)
4. "Fast and stable cone-beam filtered backprojection method for non-planar orbits" Hiroyuki Kudo and Tsuneo Saito, Physics in Medicine and Biology, Vol.43, No.4, pp.747-760 (1998)
5. "Three-dimensional monochromatic x-ray computed tomography using synchrotron radiation" Tsuneo Saito, Hiroyuki Kudo, Tohru Takeda, Yuji Itai, Kenji Tokumori, Fukai Toyofuku, Kazuyuki Hyodo, Masami Ando, Katsuyuki Nishimura, and Chikao Uyama, Optical Engineering, Vol.37, No.8, pp.2258-2268 (1998)
6. "Cone-beam filtered-backprojection algorithm for truncated helical data" Hiroyuki Kudo, Frederic Noo, and Michel Defrise, Physics in Medicine and Biology, Vol.43, No.10, pp.2885-2909 (1998)
7. "Performance of quasi-exact cone-beam filtered backprojection algorithm for axially truncated helical data" Hiroyuki Kudo, Sujin Park, Frederic Noo, and Michel Defrise, IEEE Transactions on Nuclear Science, Vol.46, No.3, pp.608-617 (1999)
8. "A solution to the long-object problem in helical cone-beam tomography" Michel Defrise, Frederic Noo, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.45, No.3, pp.623-643 (2000)
9. "Quasi-exact filtered backprojection algorithm for long-object problem in helical cone-beam tomography" Hiroyuki Kudo, Frederic Noo, and Michel Defrise, IEEE Transactions on Medical Imaging, Vol.19, No.9, pp.902-921 (2000)
10. "Fourier synthesis method for exact cone-beam reconstruction" Hiroyuki Kudo and Noriko Miyagi, Medical Imaging Technology, Vol.19, No.5, pp.377-388 (2001)
11. "Rebinning-based algorithms for helical cone-beam CT" Michel Defrise, Frederic Noo, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.46, No.11, pp.2911-2937 (2001)
12. "Image reconstruction from fan-beam projections on less than a short-scan" Frederic Noo, Michel Defrise, Rolf Clackdoyle, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.47, No.14, pp.2525-2546 (2002)
13. "An accurate iterative reconstruction algorithm for sparse objects: application to 3-D blood-vessel reconstruction from a limited number of projections" Meihua Li, Haiquan Yang, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.47, No.15, pp.2599-2609 (2002)
14. "Subset-dependent relaxation in block-iterative algorithms for image reconstruction in emission tomography" Eiichi Tanaka and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.48, No.10, pp.1405-1422 (2003)
15. "Improved two-dimensional rebinning of helical cone-beam computerized tomography data using John's equation" Michel Defrise, Frederic Noo, and Hiroyuki Kudo, Inverse Problems, Vol.19, No.5, pp.S41-S54 (2003)
16. "A new reconstruction strategy for image improvement in pinhole SPECT" Tsutomu Zeniya, Hiroshi Watabe, Toshiyuki Aoi, Kyeong Min Kim, Noboru Teramoto, Takuya Hayashi, Antti Sohlberg, Hiroyuki Kudo, and Hidehiro Iida, European Journal of Nuclear Medicine, Vol.31, No.8, pp.1166-1172 (2004)
17. "Investigation of saddle trajectories for cardiac CT imaging in cone beam geometry" Jed D. Pack, Frederic Noo, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.49, No.10, pp.2317-2336 (2004)
18. "Improved iterative algorithm for sparse object reconstruction and its performance evaluation with micro-CT data" Meihua Li, Hiroyuki Kudo, Jicun Hu, and Roger H. Johnson, IEEE Transactions on Nuclear Science, Vol.51, No.3, pp.659-666 (2004)
19. "Exact and approximate algorithms for helical cone-beam CT" Hiroyuki Kudo, Thomas Rodet, Frederic Noo, and Michel Defrise, Physics in Medicine and Biology, Vol.49, No.13, pp.2913-2931 (2004)
20. "Image reconstruction theory for multislice x-ray computed tomography with a gantry tilt" Frederic Noo, Michel Defrise, and Hiroyuki Kudo, IEEE Transactions on Medical Imaging, Vol.23, No.9, pp.1109-1116 (2004)

21. "Millimeter-wave scanning near-field anisotropy microscopy" Tatsuo Nozokido, Ryohei Iibuchi, Jongsuck Bae, Koji Mizuno, and Hiroyuki Kudo, Review of Scientific Instruments, Vol.76, pp.033702-1~033702-6 (2005)
22. "Exact cone beam reconstruction for a saddle trajectory" Haiquan Yang, Meihua Li, Kazuhito Koizumi, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.51, No.5, pp.1157-1172 (2006)
23. "Statistical image reconstruction for transmission CT using row-action algorithms with subset-dependent relaxation" Eiichi Tanaka and Hiroyuki Kudo, Medical Imaging Technology, Vol.24, No.2, pp.114-124 (2006)
24. "A FBP type cone-beam reconstruction algorithm with Radon space interpolation ability for axially truncated data from a circular orbit" Haiquan Yang, Meihua Li, Kazuhito Koizumi, and Hiroyuki Kudo, Medical Imaging Technology, Vol.24, No.3, pp.201-208 (2006)
25. "Truncated Hilbert transform and image reconstruction from limited tomographic data" Michel Defrise, Frederic Noo, Rolf Clackdoyle, and Hiroyuki Kudo, Inverse problems, Vol.22, No.3, pp.1037-1053 (2006)
26. "View independent reconstruction algorithms for cone beam CT with general saddle trajectory" Haiquan Yang, Meihua Li, Kazuhito Koizumi, and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.51, No.15, pp.3865-3884 (2006)
27. "Tiny a priori knowledge solves the interior problem in computed tomography" Hiroyuki Kudo, Matias Courdurier, Frederic Noo, and Michel Defrise, Physics in Medicine and Biology, Vol.53, No.9, pp.2307-2331 (2008)
28. "Analyzing cerebral blood-flow SPECT images for the diagnosis of dementia: a new approach FUSE" Hiroyuki Kudo, Takashi Asada, and Tohoru Takeda, Medical Imaging Technology, Vol.26, No.3, pp.169-174 (2008)
29. "Motion compensated fan-beam reconstruction for nonrigid transformation" Katsuyuki Taguchi and Hiroyuki Kudo, IEEE Transactions on Medical Imaging, Vol.27, No.7, pp.907-917 (2008)
30. "Solving the interior problem of computed tomography using a priori knowledge" Matias Courdurier, Frederic Noo, Michel Defrise, and Hiroyuki Kudo, Inverse problems, Vol.24, No.6, Paper No. 065001 (2008)
31. "Intensity-based Bayesian framework for image reconstruction from sparse projection data" Essam A. Rashed and Hiroyuki Kudo, Medical Imaging Technology, Vol.27, No.4, pp.243-251 (2009)
32. "Iterative region-of-interest reconstruction from truncated CT projection data under blind object support" Essam A. Rashed and Hiroyuki Kudo, Medical Imaging Technology, Vol.27, No.5, pp.321-331 (2009)
33. "Optimal relaxation parameters of DRAMA (dynamic RAMLA) aiming at one-pass image reconstruction for 3D-PET" Eiichi Tanaka and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.55, No.10, pp.1917-2939 (2010)
34. "General fan-beam reconstruction algorithm for free-form trajectory with plus-minus weighting scheme" Zhen Wang, Essam A. Rashed, and Hiroyuki Kudo, Medical Imaging Technology, Vol.29, No.5, pp.250-258 (2011)
35. "Statistical image reconstruction from limited projection data with intensity priors" Essam A. Rashed and Hiroyuki Kudo, Physics in Medicine and Biology, Vol.57, No.7, pp.2039-2061 (2012)
36. "Improved metal artifact reduction method for X-ray CT by reducing the effect of interpolation errors" Zhen Wang and Hiroyuki Kudo, Medical Imaging Technology, Vol.30, No.4, pp.201-208 (2012)
37. "GPU-based PET image reconstruction using an accurate geometrical system mode" Shoko Kinouchi, Taiga Yamaya, Eiji Yoshida, Hideaki Tashima, Hiroyuki Kudo, Hideaki Haneishi, and Mikio Suga, IEEE Transactions on Nuclear Science, Vol.59, No.5, pp.1977-1983 (2012)
38. "Towards a high-resolution synchrotron radiation imaging with statistical iterative reconstruction" Essam A. Rashed and Hiroyuki Kudo, Journal of Synchrotron Radiation, Vol.20, pp.116-124 (2013)
39. "Near-field imaging of thermal radiation at low temperatures by passive millimeter-wave microscopy" Tatsuo Nozokido, Manabu Ishino, Hiroyuki Kudo, and Jongsuck Bae, Review of Scientific Instruments, Vol.84, No.3, Paper No. 036103(3pages) (2013)
40. "Interior reconstruction in computed tomography using a priori knowledge outside the region of interest" Zhen Wang and Hiroyuki Kudo, Medical Imaging Technology, Vol.31, No.2, pp.113-120 (2013)
41. "Image reconstruction for sparse-view CT and interior CT – introduction to compressed sensing and differentiated backprojection" Hiroyuki Kudo, Taizo Suzuki, and Essam A. Rashed, Quantitative Imaging in Medicine and Surgery, Vol.3, No.3, pp.147-161 (2013)
42. "Restoration of lost frequency in OpenPET imaging: comparison between the method of convex projections and the maximum likelihood expectation maximization method" Hideaki Tashima, Takayuki Katsunuma,

Principal Investigator/Program Director (Last, First, Middle):

Hiroyuki Kudo, Hideo Murayama, Takashi Obi, Mikio Suga, and Taiga Yamaya, Radiological Physics and Technology, Vol.7, No.2, pp.329-339 (2014)

43. "An improved phase shift reconstruction algorithm of fringe scanning technique for x-ray microscopy" Songzhe Lian, Haiquan Yang, Hiroyuki Kudo, Atsushi Momose, and Wataru Yashiro, Review of Scientific Instruments, Vol.86, Paper No. 023707(7 pages) (2015)
44. "Sparsity-constrained three-dimensional image reconstruction for C-arm angiography" Essam A. Rashed, Mohammad al-Shatoury, and Hiroyuki Kudo, Computers in Biology and Medicine, Vol.62, No., pp.141-163 (2015)
45. "Extended block-lifting-based lapped transforms" Taizo Suzuki and Hiroyuki Kudo, IEEE Signal Processing Letters, Vol.22, No.10, pp.1657-1660 (2015)
46. "2D non-separable block-lifting structure and its application to M-channel perfect reconstruction filter banks for lossy-to-lossless image coding" Taizo Suzuki and Hiroyuki Kudo, IEEE Transactions on Image Processing, Vol.24, No.12, pp.4943-4951 (2015)
47. "Probabilistic atlas prior for CT image reconstruction" Essam A. Rashed and Hiroyuki Kudo, Computer Methods and Programs in Biomedicine, Vol.128, No.5, pp.119-136 (2016)

**D. Research Support (supports before 2005 are NOT included, only accepted grants applied as a leader are listed, fundings from companies are NOT included).** List selected or ongoing research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and responsibilities of principal investigator identified above.

Grant in Aid for Scientific Research (Japan): No.15300155 (Kudo) 4/1/03-3/31/05 (finished)  
Title: Conceptual design and image reconstruction for 4-D CT scanners

Grant in Aid for Scientific Research (Japan): No.16035202 (Kudo) 4/1/04 – 3/31/06 (finished)  
Title: Fusion of MRI and SPECT for intelligent computer aided diagnosis of dementia

Grant in Aid for Scientific Research (Japan): No.17032001 (Kudo) 4/1/06-3/31/07 (finished)  
Title: Combining image generation and image processing for computer aided diagnosis of cerebral blood-flow SPECT images

The Kurata Memorial Hitachi Science and Technology Foundation: (Kudo) 4/1/08 – 3/31/09 (finished)  
Title: Research on ultra low-dose CT using the region-of-interest imaging

Tateishi Science and Technology Foundation: (Kudo) 4/1/08 – 3/31/09 (finished)  
Title: Design of patient-friendly next-generation CT scanners

Terumo Lifescience Foundation: (Kudo) 4/1/08 – 3/31/09 (finished)  
Title: Research on ultra low-dose CT

Grant in Aid for Scientific Research (Japan): No. 21611001 (Kudo) 4/1/09-3/31/12 (finished)  
Title: Research on next generation ultra low-dose CT

Grant in Aid for Scientific Research (Japan): No. 22103502 (Kudo) 4/1/10-3/31/12 (finished)  
Title: Fusion of medical image construction and computer-aided-diagnosis

Grant in Aid for Scientific Research (Japan): No. 2200052 (Kudo) 4/1/10-3/31/12 (finished)  
Title: New approach to cardiac CT imaging with low patient dose and high image quality

Grant in Aid for Scientific Research (Japan): No. 24103702 (Kudo) 4/1/12-3/31/14 (finished)  
Title: Highly advanced medical imaging based on computational anatomy model

Principal Investigator/Program Director (Last, First, Middle):

Grant in Aid for Scientific Research (Japan): No. 24601004 (Kudo) 4/1/12-3/31/15 (finished)  
Title: Development of PET image reconstruction algorithms for the age of multi-modality imaging

Development of Systems and Technology for Advanced Measurement and Analysis (JST, Japan Science and Technology Agency) (Hata,Furukawa,Kudo,Sato) 10/1/13-3/31/17 (active)  
Title: Development of Real-Time Electron Tomography System for Material Science

JST Exploratory Research for Advanced Technology (ERATO), Quantum-Beam Phase Imaging Project (JST, Japan Science and Technology Agency) (Kudo) 4/1/15-3/31/20 (active)  
Title: Research on Image Analysis

Grant in Aid for Scientific Research (Japan): No. 15K06103 (Kudo) 4/1/15-3/31/18 (active)  
Title: Construction of Fundamentals of Super Compressed Sensing and Applications to Various Tomographic Imaging Modalities