

Takuya Sakamoto

Email: sakamoto.takuya.8n@kyoto-u.ac.jp
Tel/Fax: +81-75-383-2257
http://www.ist.kuee.kyoto-u.ac.jp/~t-sakamo

Graduate School of Engineering
Kyoto University
Kyotodaigaku-Katsura
Nishikyo-ku, Kyoto
615-8510, Japan

Research Area

Noncontact sensing of human activities and vital signs, radar imaging and signal processing, biomedical engineering, medical ultrasound sensing and imaging

Ph.D. Dissertation

Ph.D in Informatics, Kyoto University, January 2005
"Nonparametric imaging algorithms for UWB pulse radars"

Educational Background

2005	PhD, Communications and Computer Engineering, Grad. School of Informatics, Kyoto University Thesis Advisor: Prof. Toru Sato
2002	M.I., Communications and Computer Engineering, Grad. School of Informatics, Kyoto University
2000	B.E., Electrical and Electronic Engineering, Kyoto University

Professional Employment

Associate Professor, Kyoto University, Grad. School of Engineering, Kyoto, Japan	Apr. 2019 - present
PRESTO Researcher, Japan Science and Technology Agency, Kawaguchi, Japan	Oct. 2018 - present
Visiting Scholar, Univ. of Hawaii at Manoa, Dept. Electrical Eng., Honolulu, USA	Apr. 2017 - Sep. 2017
Visiting Researcher, Delft University of Technology, Delft, The Netherlands	Aug. 2016 - Sep. 2016
Visiting Researcher, Delft University of Technology, Delft, The Netherlands	Mar. 2016
Visiting Researcher, Delft University of Technology, Delft, The Netherlands	Sep. 2015
Associate Professor, Univ. of Hyogo, Grad. School of Engineering, Himeji, Japan	Apr. 2015 - Mar. 2019
Part-time Researcher, Kyoto University, Grad. School of Informatics, Kyoto, Japan	Apr. 2015 - Mar. 2019
Visiting Researcher, Delft University of Technology, Delft, The Netherlands	Sep. 2011 - Nov. 2013
Visiting Researcher, University of Nice Sophia-Antipolis, Antibes, France	Sep. 2009
Assistant Professor, Kyoto University, Grad. School of Informatics, Kyoto, Japan	Apr. 2007 - Mar. 2015
Research Associate, Kyoto University, Grad. School of Informatics, Kyoto, Japan	Apr. 2006 - Mar. 2007
JSPS PD Researcher, Kyoto University, Grad. School of Informatics, Kyoto, Japan	Apr. 2005 - Mar. 2006
Lecturer (Researcher), Kyoto Univ., Grad. School of Engineering, Kyoto, Japan	Feb. 2005 - Mar. 2005

Awards

2019	Achievement Award, Institute of Electron., Information and Commun. Engineers, Electronics Society
2018	Achievement Award, Institute of Electron., Information and Commun. Engineers, Commun. Society
2016	Masao Horiba Award
2015	Achievement Award, Institute of Electron., Information and Commun. Engineers, Commun. Society
2012	Best Paper Award, International Symposium on Antennas and Propagation
2007	Young Researchers Award, Institute of Electronics, Information and Communication Engineers
2007	Best Presentation Award, Institute of Electrical Engineers of Japan
2007	Best Paper Award, IEICE Communications Society
2004	Paper Award, International Symposium on Antennas and Propagation

Professional Service

Vice Chair	International Symposium on Antennas and Propagation 2020 Registration Committee	2018 - present
Publications Co-Chair	IEEE International Geoscience and Remote Sensing Symposium 2019	2018 - present
Associate Editor	IEICE Transactions on Communications	2018 - present
Review Committee	13th European Conference on Antennas and Propagation	2018 - present
Secretary	IEEE Antennas and Propagation Society Kansai Joint Chapter	2017 - present
Secretary	IEEJ Technical Committee on Electromagnetic Theory	2018 - present
Associate Editor	IEICE Electronics Express	2016 - present
Steering Committee	IEICE Kansai Section	2016 - 2018
Editorial Secretary	IEICE Transactions on Communications Special Section on Recent Progress in Electromagnetic Theory and Its Applications	2016 - present
Secretary	IEICE Technical Committee on Electromagnetic Theory	2016 - 2018
Session Convener	European Conference on Antennas and Propagation	2016
Guest Associate Editor	IEICE Trans. Electronics Special Section on Recent Advances in Simulation Techniques and Their Applications for Electronics	2015 - 2016
Treasurer	IEEE Antennas and Propagation Society Kansai Joint Chapter	2015 - 2016
Review Committee	IEICE Transactions on Communications	2006 - present
Assistant Secretary	IEEJ Technical committee on electromagnetic theory	2006 - 2008

Publications

- [1] Takuya Sakamoto and Toru Sato, "A target shape estimation algorithm for pulse radar systems based on boundary scattering transform," *IEICE Trans. on Communications*, vol. E87-B, no. 5, pp. 1357-1365, May 2004.
- [2] Takuya Sakamoto and Toru Sato, "An estimation algorithm of target location and scattered waveforms for UWB pulse radar systems," *IEICE Trans. on Communications*, vol. E87-B, no. 6, pp. 1631-1638, June 2004.
- [3] Takuya Sakamoto, Daisuke Umehara, Yoshiteru Morihira, and Makoto Kawai, "A synchronization method for synchronous CDMA broadband communication systems with GEO satellites," *IEICE Trans. on Communications*, vol. E87-B, no. 8, pp. 2111-2118, Aug. 2004.
- [4] Takuya Sakamoto and Toru Sato, "A phase compensation algorithm for high-resolution pulse radar systems," *IEICE Trans. on Communications*, vol. E87-B, no. 11, pp. 3314-3321, Nov. 2004.
- [5] Toru Sato and Takuya Sakamoto, "Image reconstruction algorithms for UWB pulse radar systems", *IEICE Transactions Japanese Edition*, vol. J88-B, no. 12, pp. 2311-2325, Dec. 2005 (invited).
- [6] Shouhei Kidera, Takuya Sakamoto, Satoshi Sugino, and Toru Sato, "An accurate imaging algorithm with scattered waveform estimation for UWB pulse radars," *IEICE Trans. on Communications*, vol. E89-B, no. 9, pp. 2588-2595, Sep. 2006.
- [7] Takuya Sakamoto, Shouhei Kidera, Toru Sato, and Satoshi Sugino, "An experimental study on a fast 3-D imaging algorithm for UWB pulse radars", *IEICE Transactions Japanese Edition*, vol. J90-B, no. 1, pp. 66-73, Jan. 2007 (in Japanese).
- [8] Takuya Sakamoto, "A 2-D image stabilization algorithm for UWB pulse radars with fractional boundary scattering transform," *IEICE Trans. on Communications*, vol. E90-B, no. 1, pp. 131-139, Jan. 2007.
- [9] Takuya Sakamoto, "A fast algorithm for 3-dimensional imaging with UWB pulse radar systems," *IEICE Trans. on Communications*, vol. E90-B, no. 3, pp. 636-644, Mar. 2007.

- [10] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "A high-resolution imaging algorithm without derivatives based on waveform estimation for UWB radars," *IEICE Trans. on Communications*, vol. E90-B, no. 6, pp. 1487-1494, June 2007.
- [11] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "A robust and fast imaging algorithm with an envelope of circles for UWB pulse radars," *IEICE Trans. on Communications*, vol. E90-B, no. 7, pp. 1801-1809, July 2007.
- [12] Kentaro Isoda, Takuya Sakamoto, and Toru Sato, "Effective echo detection and accurate orbit estimation algorithms for space debris radar," *IEICE Trans. on Communications*, vol. E91-B, no. 3, pp. 887-895, Mar. 2008.
- [13] Shouhei Kidera, Yusuke Kani, Takuya Sakamoto, and Toru Sato, "Fast and accurate 3-D imaging algorithm with linear array antennas for UWB pulse radars," *IEICE Trans. on Communications*, vol. E91-B, no. 8, pp. 2683-2691, Aug. 2008.
- [14] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "High-resolution and real-time three-dimensional imaging algorithm with envelope of spheres for UWB radars," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 46, no. 11, pp. 3503-3513, Nov. 2008.
- [15] Takuya Sakamoto and Toru Sato, "2-dimensional imaging of human bodies with UWB radar using approximately uniform walking motion along a straight line with the SEABED algorithm," *IEICE Trans. on Communications*, vol. E91-B, no. 11, pp. 3695-3703, Nov. 2008.
- [16] Takuya Sakamoto and Toru Sato, "Code-division multiple transmission for high-speed UWB radar imaging with an antenna array," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 47, no. 4, pp. 1179-1186, Apr. 2009.
- [17] Tomoki Kimura, Hirofumi Taki, Takuya Sakamoto, and Toru Sato, "Experimental study of high-range-resolution medical acoustic imaging for multiple target detection by frequency domain interferometry," *Japanese Journal of Applied Physics*, vol. 48, no. 7, 07GJ07, July 2009.
- [18] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "High-resolution 3-D imaging algorithm with an envelope of modified spheres for UWB through-the-wall radars," *IEEE Trans. on Antennas & Propagation*, vol. 57, no. 11, pp. 3520-3529, Nov. 2009.
- [19] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "Accurate UWB radar three-dimensional imaging algorithm for complex boundary without range points connections," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 48, no. 4, pp. 1993-2004, Apr. 2010.
- [20] Hirofumi Taki, Takuya Sakamoto, Makoto Yamakawa, Tsuyoshi Shiina, and Toru Sato, "Calculus detection for ultrasonography using decorrelation of forward scattered wave," *J. Med. Ultrasonics*, vol. 37, no. 3, pp. 129-135, July 2010.
- [21] Yuji Matsuki, Takuya Sakamoto, and Toru Sato, "An imaging algorithm of a target with arbitrary motion for ultra wide-band radar with a small number of antennas," *IEICE Trans. on Communications*, vol. E94-B, no. 3, pp. 742-749, Mar. 2011.
- [22] Hirofumi Taki, Takuya Sakamoto, Makoto Yamakawa, Tsuyoshi Shiina, Kenichi Nagae, and Toru Sato, "Small calcification depiction in ultrasound B-mode images using decorrelation of echoes caused by forward scattered waves," *J. Med. Ultrasonics*, vol. 38, no. 2, pp. 73-80, April 2011.

- [23] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "Super-resolution UWB radar imaging algorithm based on extended Capon with reference signal optimization," *IEEE Trans. on Antennas & Propagation*, vol. 59, no. 5, pp. 1606 - 1615, May 2011.
- [24] Takuya Sakamoto, Hirofumi Taki, and Toru Sato, "An experimental study of ultrasonic imaging with a reduced number of array elements using the envelope method," *Acoustical Science and Technology (AST), the Acoustical Society of Japan*, vol. 32, no. 4, pp. 143-150, July 2011.
- [25] Shuhei Fujita, Takuya Sakamoto, and Toru Sato, "2-dimensional accurate imaging with UWB radar using indoor multipath echoes for a target in shadow regions," *IEICE Trans. on Communications*, vol. E94-B, no. 8, pp. 2366-2374, Aug. 2011.
- [26] Hirofumi Taki, Takuya Sakamoto, Makoto Yamakawa, Tsuyoshi Shiina, and Toru Sato, "Ultrasound phantom using thin wires for the depiction of calcification - comparison of cross-sections of wire targets and mass targets," *IEEJ Trans. on Electronics, Information and Systems*, vol. 131, no. 9, pp. 1528-1534, Sept. 2011.
- [27] Takuya Sakamoto and Toru Sato, "Two-dimensional ultrawideband radar imaging of a target with arbitrary translation and rotation," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 49, no. 11, pp. 4493-4502, Nov. 2011.
- [28] Shouhei Kidera, Takuya Sakamoto, and Toru Sato, "Extended imaging algorithm based on aperture synthesis with double-scattered waves for UWB radars," *IEEE Trans. on Geoscience and Remote Sensing*, vol. 49, no. 12, pp. 5128-5139, Dec. 2011.
- [29] Hirofumi Taki, Kousuke Taki, Takuya Sakamoto, Makoto Yamakawa, Tsuyoshi Shiina, Motoi Kudo, and Toru Sato, "High range resolution ultrasonographic vascular imaging using frequency domain interferometry with the Capon method," *IEEE Trans. on Med. Imaging*, vol. 31, no. 2, pp. 417-429, Feb. 2012.
- [30] Kenshi Saho, Tomoki Kimura, Shouhei Kidera, Hirofumi Taki, Takuya Sakamoto, and Toru Sato, "Robust and accurate ultrasound 3-D imaging algorithm incorporating adaptive smoothing techniques," *IEICE Trans. on Communications*, vol. E95-B, no. 2, pp. 572-580, Feb. 2012.
- [31] Takuya Sakamoto, Yuji Matsuki, and Toru Sato, "Method for the three-dimensional imaging of a moving target using an ultra-wideband radar with a small number of antennas," *IEICE Trans. on Communications*, vol. E95-B, no. 3, pp. 972-979, Mar. 2012.
- [32] Hirofumi Taki, Takuya Sakamoto, Makoto Yamakawa, Tsuyoshi Shiina, and Toru Sato, "Small calcification indicator in ultrasonography using correlation of echoes with a modified Wiener filter," *Journal of Medical Ultrasonics*, vol. 39, pp. 127-135, July 2012.
- [33] Hirofumi Taki, Takuya Sakamoto, Makoto Yamakawa, Tsuyoshi Shiina, and Toru Sato, "High resolution ultrasound imaging using frequency domain interferometry — suppression of interference using adaptive frequency averaging —," *IEEJ Trans. on Electron. Inf. Syst.*, vol. 132, no. 10, pp. 1552-1557, Oct. 2012.
- [34] Kenshi Saho, Takuya Sakamoto, Toru Sato, Kenichi Inoue, and Takeshi Fukuda, "Pedestrian imaging using UWB Doppler radar interferometry," *IEICE Trans. on Communications*, vol. E96-B, no. 2, pp. 613-623, Feb. 2013.
- [35] Kenshi Saho, Takuya Sakamoto, Toru Sato, Kenichi Inoue, and Takeshi Fukuda, "Accurate and real-time pedestrian classification based on UWB Doppler radar images and their radial velocity features," *IEICE Trans. on Communications*, vol. E96-B, no. 10, pp. 2563-2572, Oct. 2013.

- [36] Kenshi Saho, Hiroaki Homma, Takuya Sakamoto, Toru Sato, Kenichi Inoue, and Takeshi Fukuda, "Accurate image separation method for two closely spaced pedestrians using UWB Doppler imaging radar and supervised learning," *IEICE Trans. on Communications*, vol. E97-B, no. 6, pp. 1223-1233, June 2014.
- [37] Hirofumi Taki, Shinya Tanimura, Takuya Sakamoto, Tsuyoshi Shiina, and Toru Sato, "Accurate ultrasound imaging based on range point migration method for the depiction of fetal surface," *J. Med. Ultrasonics*, DOI: 10.1007/s10396-014-0574-4, Sep. 2014.
- [38] Takuya Sakamoto, Toru Sato, Pascal J. Aubry, and Alexander G. Yarovoy, "Texture-based automatic separation of echoes from distributed moving targets in UWB radar signals," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 53, no. 1, pp. 352-361, Jan. 2015.
- [39] Takuya Sakamoto, Ryohei Imasaka, Hirofumi Taki, Toru Sato, Mototaka Yoshioka, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Accurate heartbeat monitoring using ultra-wideband radar," *IEICE Electronics Express*, vol. 12, no. 3, pp. 20141197, Feb. 2015.
- [40] Takuya Sakamoto, Toru Sato, Pascal Aubry, and Alexander Yarovoy, "Ultra-wideband radar imaging using a hybrid of kirchhoff migration and Stolt F-K migration with an inverse boundary scattering transform," *IEEE Transactions on Antennas and Propagation*, vol. 63, no. 8, pp. 3502-3512, Aug. 2015.
- [41] Takuya Sakamoto, Hiroki Yamazaki, and Toru Sato, "Two-dimensional imaging of a pedestrian using multiple wideband Doppler interferometers with clustering-based echo association," *IEICE Transactions on Communications*, vol. E98-B, no. 9, pp. 1795-1803, Sep. 2015.
- [42] Takuya Sakamoto, Shigeaki Okumura, Ryosuke Imanishi, Hirofumi Taki, Toru Sato, Mototaka Yoshioka, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Remote heartbeat monitoring from human soles using 60-GHz ultra-wideband radar," *IEICE Electronics Express*, vol. 12, no. 21, pp. 20150786, Oct. 2015.
- [43] Yuan He, Pavlo Molchanov, Takuya Sakamoto, Pascal Aubry, Francois Le Chevalier, and Alexander Yarovoy, "Range-Doppler surface: a tool to analyse human target in ultra-wideband radar," *IET Radar, Sonar & Navigation*, vol. 9, no. 9, pp. 1240-1250, Dec. 2015.
- [44] Hiroki Yamazaki, Takuya Sakamoto, Hirofumi Taki, and Toru Sato, "False image suppression in two-dimensional shape estimates of a walking human using multiple ultra-wideband Doppler radar interferometers," *IEICE Transactions on Communications*, vol. E99-B, no. 1, pp. 134-142, Jan. 2016.
- [45] Thomas Fromenteze, Ettien Kpre, David Carsenat, Cyril Decroze, and Takuya Sakamoto, "Single-shot compressive multiple-inputs multiple-outputs radar imaging using a two-port passive device," *IEEE Access*, vol. 4, pp. 1050-1060, March 2016.
- [46] Takuya Sakamoto, Ryohei Imasaka, Hirofumi Taki, Toru Sato, Mototaka Yoshioka, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Feature-based correlation and topological similarity for interbeat interval estimation using ultrawideband radar," *IEEE Transactions on Biomedical Engineering*, vol. 63, no. 4, pp. 747-757, Apr. 2016.
- [47] Takuya Sakamoto, Toru Sato, Pascal Aubry, and Alexander Yarovoy, "Fast imaging method for security systems using ultrawideband radar," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 52, no. 2, pp. 658-670, Apr. 2016.
- [48] Shigeaki Okumura, Takuya Sakamoto, Toru Sato, Mototaka Yoshioka, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Comparison of clutter rejection techniques for measurement of small displacements of body surface using radar," *Electronics Letters*, vol. 52, no. 19, pp. 1635-1637, Sep. 2016.

- [49] Takuya Sakamoto, Daichi Akiyama, Takuro Sato, and Toru Sato, "Spectrum-free estimation of Doppler velocities using ultra-wideband radar," *IEEE Access*, vol. 5, pp. 3240-3249, Oct. 2016.
- [50] Takuya Sakamoto, Akihiko Matsuoka, and Hidekuni Yomo, "Estimation of Doppler velocities from sub-Nyquist ultra-wideband radar measurements," *IEEE Sensors Journal*, vol. 16, no. 23, pp. 8557-8565, Dec. 2016.
- [51] Motoshi Anabuki, Shigeaki Okumura, Takuya Sakamoto, Kenshi Saho, Toru Sato, Mototaka Yoshioka, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Ultrawideband radar imaging using adaptive array and Doppler separation," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 53, no. 1, pp. 190-200, Jan. 2017.
- [52] Takuya Sakamoto, Masashi Muragaki, Kazunori Tamura, Shigeaki Okumura, Toru Sato, Kenji Mizutani, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Measurement of instantaneous heart rate using radar echoes from the human head," *Electronics Letters*, doi:10.1049/el.2018.0811, July 2018
- [53] Takuya Sakamoto, Pascal J. Aubry, Shigeaki Okumura, Hirofumi Taki, Toru Sato, and Alexander G. Yarovoy, "Noncontact measurement of the instantaneous heart rate in a multi-person scenario using X-band array radar and adaptive array processing," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, doi:10.1109/JETCAS.2018.2809582, June 2018.
- [54] Ashikur Rahman, Victor Lubecke, Olga Boric-Lubecke, Jan Prins, and Takuya Sakamoto, "Doppler radar techniques for accurate respiration characterization and subject identification," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, doi:10.1109/JETCAS.2018.2818181, June 2018.
- [55] Kentaro Oishi, Shigeaki Okumura, Takuya Sakamoto, Toru Sato, Kenji Mizutani, Kenichi Inoue, Takeshi Fukuda, and Hiroyuki Sakai, "Non-contact interbeat interval measurement using higher harmonic components of body surface displacement with ultra-wideband Doppler radar", *IEICE Transactions Japanese Edition*, vol. J101-C, no. 11, pp. 412-420, Nov. 2018 (invited).
- [56] Takuya Sakamoto, Xiaomeng Gao, Ehsan Yavari, Ashikur Rahman, Olga Boric-Lubecke, and Victor M. Lubecke, "Hand gesture recognition using a radar echo I-Q plot and convolutional neural network", *IEEE Sensors Letters*, vol. 2, no. 3, pp. 1-4, doi:10.1109/LSSENS.2018.2866371, Sep. 2018.

International Patents

Date	Number	Inventors	Title
May 2016	US9693738B2	Mototaka Yoshioka, Takeshi Fukuda, Toru Sato, <u>Takuya Sakamoto</u>	Heartbeat measuring apparatus, heartbeat measuring method, and recording medium
Mar. 2013	US20140213902A1	Kenichi Nagae, Hirofumi Taki, <u>Takuya Sakamoto</u> , Toru Sato	Subject information obtaining apparatus, method for obtaining subject information, and program
Aug. 2012	US9304191B2	Kenichi Nagae, Hirofumi Taki, <u>Takuya Sakamoto</u> , Toru Sato	Subject information obtaining apparatus, subject information obtaining method, and program
May 2012	US8686894B2	Takeshi Fukuda, Kenichi Inoue, Toru Sato, <u>Takuya Sakamoto</u> , Kenshi Saho	Radar imaging apparatus, imaging method, and program thereof
Mar. 2009	US2011/0012774A1	Hiroyuki Sakai, Takeshi Fukuda, Kenichi Inoue, Toru Sato, <u>Takuya Sakamoto</u> , Yusuke Kani	Range finder, shape measuring device, and methods for them
Apr. 2008	US8410978B2	Hiroyuki Sakai, Takeshi Fukuda, <u>Takuya Sakamoto</u> , Toru Sato	Shape measurement instrument and shape measurement method