(Signature) _____ _____

(Typed Name) **Jingyan Xu** **(Date of this version)**

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Appointments:

Jan 2013-present	Assistant Professor	Department of Radiology, School of Medicine Johns Hopkins University, Baltimore, Maryland
Jan 2010 - Dec 2012	Instructor	Department of Radiology, School of Medicine Johns Hopkins University, Baltimore, Maryland
July 2005 – Dec 2009	Research associate	Department of Radiology, School of Medicine Johns Hopkins University, Baltimore, Maryland
March 2004- July 2005	Postdoc fellow	Department of Radiology, School of Medicine Johns Hopkins University, Baltimore, Maryland

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Education and Training:

Degree	Year	Institution	Discipline
B.Sc.	1996	Tsinghua University, Beijing, China	Electrical Engineering
M.S.	1999	Stanford University, Stanford, California	Electrical Engineering
Ph.D.	2003	Stanford University, Stanford, California	Electrical Engineering

Professional Experience:

Year	Position	Institution
2001-2002	Research engineer	SC Solutions, Inc, Sunnyvale, CA.
2003-2004	Postdoc internship	Robert Bosch Corp., Research and Technology Center, Palo Alto, CA

PUBLICATIONS

Original Research (peer reviewed journal papers):

1. **Xu J**, Wang Y, Liu C, Frey EC and Tsui BMW. Attenuation correction for rotating multisegment slant-hole SPECT in breast imaging." *Physica Medica*, 2006, Vol XXI, Supplement 1, pp 44-47. PMID: 17645993
2. **Xu J**, Liu C, Wang Y, Frey EC, and Tsui BMW "Quantitative Rotating Multi-Segment Slant-Hole SPECT Mammography with Attenuation and Collimator-Detector Response Compensation." *IEEE Transactions on Medical Imaging*, Vol 26, No. 7, pp 906-916, 2007. PMID: 17649904
3. **Xu J** and Tsui BMW "Electronic noise modeling in statistical iterative reconstruction*." IEEE Transactions on Image Processing*, 2009;18(6):1228-38. PMID: 19398410, PMCID: PMC3107070
4. Huang Q, **Xu J**, Tsui BMW, and Gullberg G. "Reconstructing uniformly attenuated rotating slant-hole SPECT projection data using the DBH method." *Physics in Medicine and Biology*, 2009;54(13):4325-39. PMID: 19531850, PMCID: PMC2871256
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7. **Xu J**, Taguchi K and Tsui BMW. "Statistical projection completion in X-ray CT using consistency conditions." *Medical Imaging, IEEE Transactions on*, vol.29, no.8, pp.1528-1540, Aug. 2010. PMID: 20442046, PMCID: PMC3097419.
8. Taguchi K, **Xu J**, Srivastava S, Tsui , B MW, Cammin J, and Tang Q, "Interior region-of-interest reconstruction using a small, nearly piecewise constant subregion," *Med. Phys*. 38, 1307 (2011). PMID: 21520842, PMCID: PMC3055906.
9. Meier D, Wagenaar DJ, Chen S, **Xu J**, Yu J and Tsui BMW**.** A SPECT camera for combined MRI and SPECT for small animals", *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, Volume 652, Issue 1, 1 October 2011, Pages 731-734. PMID: 21966076 PMCID: PMC3181146.
10. **Xu J** and Tsui BMW. "Iterative Image Reconstruction in Helical Cone-Beam X-ray CT Using a Stored System Matrix Approach," *Physics in Medicine and Biology*, 57 (2012) 3477-3497. PMID: 22581218.
11. **Xu J** and Tsui BMW. "A graphical method for determining the in-plane rotation angle in circular cone-beam geometry," *Medical Imaging, IEEE Transactions on* , vol.31, no.3, pp.825-833, March 2012. PMID: 22231693.
12. **Xu J** and Tsui BMW. "Interior and Sparse-View Image Reconstruction Using a Mixed Region and Voxel Based ML-EM Algorithm," *Nuclear Science, IEEE Transactions on* , vol.59, no.5, pp.1997-2007, Oct. 2012.
13. **Xu J** and Tsui BMW. "An analytical geometric calibration method for circular cone-beam geometry," *Medical Imaging, IEEE Transactions on* , vol.32, no.9, pp.1731-1744, Sept. 2013. PMID: 23771316.
14. **Xu J** and Tsui BMW. "Quantifying the importance of the statistical assumption in statistical x-ray CT image reconstruction," *Medical Imaging, IEEE Transactions on*, vol.33, no.1, pp.61-73, Jan. 2014. PMID: 24001989.
15. **Xu J**, Fuld MK, Fung, GSK, Tsui BMW. "Task-based image quality evaluation of iterative reconstruction methods for low dose CT using computer simulations", *Physics in Medicine and Biology*, 60(7) 2881-2901, April 2015. PMID:25776521.
16. **Xu J** and Tsui BMW. "Improved intrinsic motion detection using time-of-flight PET", *IEEE Transactions on Medical Imaging,* vol.34, no.10, pp.2131-2145, Oct. 2015. PMID: 25897950.
17. **Xu J** and Noo F. "A sequential solution for anisotropic total variation image denoising with interval constraints", *Physics in Medicine and Biology*, 62(18) N428-N435, Sep. 2017.
18. **Xu J,** Noo F, and Tsui BMW. "A direct algorithm for optimization problems with the Huber penalty", *IEEE transactions on medical imaging.* 2018 Jan;37(1):162-72.
19. **Xu J** and Noo F. "A robust regularizer for multiphase CT", *in IEEE Transactions on Medical Imaging, vol. 39, no. 7, pp. 2327-2338, July 2020, doi: 10.1109/TMI.2020.2969376.*
20. Taguchi, K., Sauer, T.J., Segars, W.P., Frey, E.C., **Xu, J.**, Liapi, E., Stayman, J.W., Hong, K., Hui, F.K., Unberath, M. and Du, Y. (2020), Three-dimensional regions-of-interest–based intra-operative four-dimensional soft tissue perfusion imaging using a standard x-ray system with no gantry rotation: A simulation study for a proof of concept. *Med Phys*. https://doi.org/10.1002/mp.14514.
21. **Xu, J** and Noo F. "Patient-specific hyperparameter learning for optimization-based CT image reconstruction." *Physics in Medicine & Biology* 66.19 (2021): 19NT01.
22. **Xu, J** and Noo F. "Convex optimization algorithms in medical image reconstruction–in the age of AI." *Physics in Medicine & Biology* (2021). https://doi.org/10.1088/1361-6560/ac3842 Online early access.
23. **Xu, J** and Noo F. "Efficient gradient computation for optimization of hyperparameters." *Physics in Medicine & Biology* (2021). https://doi.org/10.1088/1361-6560/ac4442 Online early access.

Non-peer reviewed proceeding articles

1. **Xu J** and Widrow B. "On the underlying design problem of adaptive inverse control," Proceedings of the 40th Allerton Conference on Communication, Control, and Computing, Oct 2- 4, 2002, Monticello, IL.
2. **Xu J** and Widrow B. "Worst case disturbance gain in an adaptive disturbance canceler," Proceedings of the 40th Allerton Conference on Communication, Control, and Computing, Oct 2-4, 2002, Monticello, IL.
3. Liu C, Tsui BMW, Baird WH, **Xu J**, Wang Y, Frey, EC, "Evaluation of rotating slant hole SPECT mammography with respect to planar scintimammography using Monte Carlo simulation methods", 2004 IEEE Nuclear Science Symposium Conference Record, pp 4063-4067.

4. Liu C, Volokh L, Zhao X, **Xu J**, Lee TS, and Tsui BMW, "Performance evaluation of block-iterative algorithms for SPECT reconstruction," 2005 IEEE Nuclear Science Symposium Conference Record, pp. 1827-1831.
5. **Xu J**, Liu C, Tsui BMW, "Investigation of Imaging Characteristics of Rotating Multi-segment Slant-hole SPECT Mammography Using Signal-to-Noise Ratio Criterion," Proceedings of the 2005 IEEE Nuclear Science and Medical Imaging Conference, pp 1535 - 1538, Puerto Rico.
6. **Xu J**, Tsui BMW, Wang Y, Liu C, and Frey EC, "Quantitative Rotating Multi-Segment Slant-Hole SPECT Mammography with Attenuation and Collimator-Detector Response Compensation," Proceedings of the Fully 3D image reconstruction meeting in radiology and nuclear medicine, pp 311- 315, 2005, Salt Lake City, Utah.
7. Liu C, **Xu J**, and Tsui BMW, "The Effects of Object Variability on the Channelized Hotelling Observer Performance in the Evaluation of R4SSH and PH Myocardial Perfusion SPECT," IEEE Nuclear Science Symposium Conference Record 2006, pp1995 - 1999.
8. Frey EC, Wang X, Du Y, Taguchi K, **Xu J**, and Tsui BMW. "Investigation of the use of photon counting x-ray detectors with energy discrimination capability for material decomposition in micro-computed tomography" Proceedings of SPIE Medical Imaging 2007, Physics of Medical Imaging, Volume 6510, pp 65100A.
9. Frey EC, Taguchi K, Kapusta M, **Xu J**, Orskaug T, Wagenaar D, Patt B, and Tsui, BMW, Microcomputed tomography with a photon-counting x-ray detector" Proceedings of SPIE Medical Imaging 2007, Physics of Medical Imaging, Volume 6510, pp 65101R.
10. **Xu J**, Frey EC, Taguchi K, and Tsui BMW, "A Poisson likelihood iterative reconstruction algorithm for material decomposition in CT," Proceedings of the SPIE, Volume 6510, pp. 65101z, 2007.
11. Taguchi K, Zhang M, Frey EC, and **Xu J**. "Image-domain material decomposition using photon-counting CT", Proceedings of SPIE Medical Imaging 2007, Physics of Medical Imaging, Volume 6510, pp 651008.
12. **Xu J** and Tsui BMW. "A compound Poisson maximum likelihood iterative reconstruction algorithm for x-ray CT." Proceedings of the Fully 3D image reconstruction meeting in radiology and nuclear medicine, 2007, pp 108 – 112, Lindau, Germany.
13. Wang X, **Xu J**, and Frey EC. "Optimization of energy window widths in basis material decomposition using a multi-window photon counting X-ray detector," IEEE Nuclear Science Symposium Conference Record 2007, pp 3826 - 3829.
14. Huang Q, **Xu J**, Tsui BMW, and Gullberg G. "Reconstructing uniformly attenuated rotating slant-hole SPECT projection data using the DBH method." In press. IEEE Nuclear Science Symposium Conference Record 2008.
15. Wang X, **Xu J**, Tsui BMW, and Frey EC. "Enhanced discrimination of soft and calcified arterial plaques using computed tomography with a multi-energy-bin photon counting x-ray detector." Proceedings of SPIE Medical Imaging 2009, Physics of Medical Imaging, Volume 7258.
16. **Xu J**, Taguchi K, Gullberg G, and Tsui BMW. "A dual formulation of a penalized maximum likelihood X-ray CT reconstruction problem." In press. Proceedings of SPIE Medical Imaging 2009, Physics of Medical Imaging, Volume 7258.
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18. **Xu J**, Katsuyuki Taguchi, and Benjamin M. W. Tsui. Statistical projection completion in x-ray CT using consistency conditions. Proceedings of the 10th International meeting on fully 3D image reconstruction in radiology and nuclear medicine, pp 246 -- pp 250. Beijing, China, Sep 5-10, 2009.
19. **Xu J**, Chi Liu, and Benjamin M. W. Tsui. MammoSPECT using rotating slant-hole collimator designs. Proceedings of the 10th International meeting on fully 3D image reconstruction in radiology and nuclear medicine, pp 351 -- pp 353. Beijing, China, Sep 5-10, 2009.
20. BMW Tsui, JW Hugg, **J Xu**, S Chen, D Meier, W Edelstein, A El-Sharkawy, DJ Wagenaar, BE Patt. "Design and development of MR-compatible SPECT systems for simultaneous SPECT-MR imaging of small animals," Medical Imaging 2011: Physics of Medical Imaging, Vol 7961. Pages 79611Y 2011/3/16.

21. M Ismail, K Taguchi, **Xu J**, BMW Tsui, EM Boctor. "3D-guided CT reconstruction using time-of-flight camera," Medical Imaging 2011: Visualization, Image-Guided Procedures, and Modeling. Vol 7964. Pages 796429. 2011/3/2.
22. AJ Rittenbach, **Xu J**, BMW Tsui, "Acquisition strategies of a dual head rotating 4-Segment Slant-Hole (R4SSH) SPECT System for Improved Myocardial Perfusion SPECT Imaging," Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), 2011 IEEE, pp 3335-3338.
23. BMW Tsui, **Xu J**, A Rittenbach, S Chen, A El-Sharkaway, WA Edelstein, X Guo, A Liu, JW Hugg. "High performance SPECT system for simultaneous SPECT-MR imaging of small animals," Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), 2011 IEEE. Pages 3178-3182.
24. AJ Rittenbach, **Xu J**, J Hugg, BMW Tsui, "The design of optimal multipinhole collimators for a seamless SPECT detector ring," Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), 2011 IEEE, pp 3402-3405.
25. A Rittenbach, **Xu J**, AM El-Sharkawy, WA Edelstein, K Parnham, J Hugg, BMW Tsui, "Continuing evaluation of an MR compatible SPECT insert for simultaneous SPECT-MR imaging of small animals," Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), 2013 IEEE, pp1-5.
26. **Xu J** and BWM Tsui. "C-arm CT image reconstruction from sparse projections," International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine, Vol 5, pages 34-7. 2013.
27. J Wang, L Hu, T Feng, **Xu J**, L Shao, BMW Tsui, "Improved spatial and temporal resolution of gated myocardial perfusion PET using post reconstruction dual respiratory and cardiac motion compensation," Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC), 2014 IEEE, pp 1-4.
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29. **Xu J**, F Noo, B Tsui, "Image registration using convex relaxation and the ADMM algorithm," Proceedings of The 2017 International Conference on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine. Page 696-701. June 18-23, 2017.
30. BMW Tsui, TS Lee and **Xu J.** "Molecular Breast Tomosynthesis Imaging with Multi-Pinhole Collimator," Proceedings of The 2017 International Conference on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine. Page 721-725. June 18-23, 2017.
31. **Xu J** and F Noo. "Model-based image reconstruction with a hybrid regularizer" Medical Imaging 2018: Physics of Medical Imaging, Vo 10573. Pages 1057338.
32. **Xu J**, F Noo. "Joint image reconstruction for multiphase CT," Proceedings of the 5th International Conference on Image Formation in X-ray CT, May 20-23, 2018, Salt Lake City, Utah, pp 5-9.
33. **Xu J**, F Noo. "Model based image reconstruction with concomitant scale estimation," Proceedings of the 5th International Conference on Image Formation in X-ray CT, May 20-23, 2018, Salt Lake City, Utah. pp 333-338.
34. **Xu J**, F Noo. "Adaptive smoothing algorithms for MBIR in CT applications," Proceedings Volume 11072, 15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine; 110720C (2019), Jun 2-6, 2019, Philadelphia, PA.

Abstracts

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2. Shilov M, Frey EC, Segars WP, **Xu J**, and Tsui BMW "Improved Monte-Carlo simulations for dynamic PET, Journal of Nuclear Medicine 2006; 47 (Supplement 1):197P
3. **Xu J** and Tsui BMW "Electronic readout noise compensation in iterative x-ray CT reconstruction." 2007 IEEE nuclear science symposium and medical imaging conference, Honolulu, Hawaii.
4. Wang X, **Xu J**, and Frey EC. "Optimization of energy window widths in basis material decomposition using a multi-window photon-counting x-ray detector." 2007 IEEE nuclear science symposium and medical imaging conference, Honolulu, Hawaii.
5. Liu C, **Xu J**, and Tsui BMW, "Collimator design principles for rotating multi-segment slant-hole SPECT." 2007 IEEE nuclear science symposium and medical imaging conference, Honolulu, Hawaii.

6. Zhang M, Frey EC, **Xu J**, and Taguchi K. "Material Identification and Dose Reduction with Photon Counting X-ray CT Detector using a Penalized Likelihood Method." RSNA 2008, Chicago, IL.
7. **Xu J** and Tsui BMW. "A multi-resolution, region-of-interest resolution compensation reconstruction approach for X-ray CT." 2008 IEEE nuclear science symposium and medical imaging conference, Dresden, Germany.
8. **Xu J**, S Chen, J Yu, D Meier, D Wagenaar, B Tsui, "Sparse-view image reconstruction with system response modeling for a stationary small animal pinhole SPECT system," Journal of Nuclear Medicine 51 (supplement 2), 1339-1339. 2010.
9. A Rittenbach, **Xu J**, A Liu, J Hugg, BMW Tsui. "The design and evaluation of optimal multipinhole collimators for a SPECT-MR system," Journal of Nuclear Medicine, Vol 52, supplement 1, pages 1951-1951. 2011.
10. **Xu J**, S Chen, B Tsui. "Application of total-variation penalized maximum likelihood image reconstruction for dynamic small animal stationary SPECT studies," Journal of Nuclear Medicine, Vol 52, supplement 1, pages 269-269. 2011.
11. J Yu, **Xu J**, Y Wang, B Lian, J Hugg, BMW Tsui. "Development and evaluation of quantitative multi-pinhole SPECT image reconstruction methods," Journal of Nuclear Medicine, Vol 52, supplement 1, pages 490-490. 2011.
12. BMW Tsui, S Chen, **Xu J**, A Rittenbach, A El-Sharkawy, W Edelstein, X Guo, A Liu, J Hugg. "Development and initial testing of a second generation SPECT insert for simultaneous small animal SPECT-MR imaging," Journal of Nuclear Medicine, Vol 52, supplement 1, pages 379-379. 2011.
13. BMW Tsui, J Yu, **Xu J**, B Lian, J Hugg. "Image reconstruction methods for a novel dual-pair multipinhole collimator set with improved small animal SPECT system performance," Journal of Nuclear Medicine, Vol 52, supplement 1, pages 264-264. 2011.
14. BMW Tsui, **Xu J**, A Rittenbach, AM El-Sharkawy, W Edelstein, A Liu, K Parnham, J Hugg. "The development of a high-resolution insert for simultaneous SPECT-MR imaging of small animals," Journal of Nuclear Medicine, Vol 53, supplement 1, pages 2401 - 2401. 2012.
15. A Rittenbach, **Xu J**, AM El-Sharkawy, W Edelstein, A Liu, K Parnham, J Hugg, BMW Tsui. "System calibration method for a CZT detector based ring-type small animal SPECT system," Journal of Nuclear Medicine, Vol 53, supplement 1, pages 2392 - 2392. 2012.
16. T Feng, GSK Fung, **Xu J**, J Wang, B Tsui. "Maximum likelihood based joint 4D motion vector field estimation and image reconstruction in 4D PET." Journal of Nuclear Medicine 54 (supplement 2), 537-537 2013.
17. BMW Tsui, **Xu J**, A Rittenbach, AM El-Sharkawy, W Edelstein, K Parnham, J Hugg. "A completed SPECT/MR insert for simultaneous SPECT/MR imaging of small animals." Journal of Nuclear Medicine 54 (supplement 2), 595-595 2013.
18. Y Dong, **Xu J**, B Tsui. "Development and evaluation of improved collimator-detector response compensation method for multi-pinhole small animal SPECT" Journal of Nuclear Medicine 54 (supplement 2), 269-269. 2013.
19. A Fabbri, VO Cencelli, **Xu J**, A Rittenbach, M Galasso, B Tsui. "Sub-millimeter resolution SPECT using a low-cost compact camera based on a continuous NaI (Tl) crystal and PSPMT array" Journal of Nuclear Medicine 54 (supplement 2), 2161-2161, 2013.
20. **Xu J** and B Tsui. "Direct regional activity characterization in emission computed tomography (ECT) using a Gaussian mixture image representation model" Journal of Nuclear Medicine 55 (supplement 1), 2118-2118. 2014.
21. A Rittenbach, **Xu J**, C Liu, M Razavian, M Sadeghi, B Tsui. "Application of a direct regional activity characterization approach to focal uptake activity quantification in pinhole SPECT" Journal of Nuclear Medicine 55 (supplement 1), 2119-2119. 2014.
22. **Xu J**, A Rittenbach, A Fabbri, VO Cencelli, B Tsui. "Pinhole SPECT image reconstruction using a dense system matrix" Journal of Nuclear Medicine, Volum 56, Issue supplement 3, Pages 46-46. 2015
23. J Wang, T Feng, **Xu J**, A Perkins, B Tsui. "An improved data-driven method for respiratory motion signal detection and magnitude estimation from noisy list-mode cardiac PET data", Journal of Nuclear Medicine 56 (supplement 3), 481-481.2015.

24. B Tsui, **Xu J**, J Wang, T Feng, M Abraham, S Zimmerman, T Schindler, "Extraction of Cardiac Motion and Myocardial Contractility from 4D Cardiac PET Images", Journal of Nuclear Medicine 56 (supplement 3), 206-206. 2015.
25. J Lin, A Rittenbach, **Xu J**, B Tsui, "Exploiting Artifact-free Projection Overlaps in Multi-Pinhole Collimator Design for a stationary Small Animal SPECT System", Journal of Nuclear Medicine 56 (supplement 3), 1871-1871. 2015.
26. Y Chang, Q Chen, A Rittenbach, **Xu J**, M Sun, B Tsui, X Yang, "Evaluation of MR compatibility of a collimator material for simultaneous SPECT/MR imaging," Journal of Nuclear Medicine 57 (supplement 2), 1937-1937. 2016.
27. A Rittenbach, **Xu J**, Y Chang, M Sun, X Yang, J Hugg, B Tsui, "Design of a Preclinical SPECT Insert using a New Generation of CZT Detector Modules for Simultaneous SPECT/MR Imaging" Journal of Nuclear Medicine 57 (supplement 2), 109-109. 2016.
28. J Wang, T Feng, **Xu J**, B Tsui, "A new cardiac motion vector field estimation method based on the optical-flow method with additional constraint from motion of an anatomical feature in 4D cardiac PET," Journal of Nuclear Medicine, 57 (supplement 3), 148-148, 2016.
29. **Xu J**, B Tsui, F Noo, "A Feature-Preserving Image Reconstruction Method for Improved Pancreaticlesion Classification in Diagnostic CT Imaging," Medical Physics 43 (6), 3700-3700. 2016.
30. Wang J, T Feng, **Xu J**, BMW Tsui, "A constrained feature-based cardiac motion estimation method for cardiac PET" Nuclear Science Symposium, Medical Imaging Conference and Room-Temperature Semiconductor Detector Workshop (NSS/MIC/RTSD), 2016, pages 1-5, IEEE 2016/10/29.
31. **Xu J**, J Wang, T-S Lee, TH Schindler, I Valenta-Schindler, SL Zimmerman, MR Abraham, BMW Tsui, "Cardiac strain analysis using clinical myocardial perfusion PET images," Journal of Nuclear Medicine, 58 (supplement 3), 580-580, 2017.
32. Lee TS, Wang J, **Xu J**, Olivier P, Perkins AE, Tung CH, Tsui BMW. "Development and evaluation of robust data-driven respiratory motion extraction methods for clinical list-mode 18F-FDG PET" Journal of Nuclear Medicine, Vo 58. Supplement 1. Pages 1350-1350.
33. Lee TS, Wang J, **Xu J**, Olivier P, Perkins AE, Tung CH, Tsui BMW. "Advancements in data-driven respiratory motion extraction methods for clinical list-mode 18F-FDG PET datasets acquired from a commercial PET scanner" *2017 IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Atlanta, GA, 2017, pp. 1-3. doi: 10.1109/NSSMIC.2017.8533107.
34. Tsui BMW, Lee TS, **Xu J**. "Cardiac motion vector field estimation from improved 4D cardiac-gated PET images with cardiac motion compensation" J Nucl Med May 1, 2018 vol. 59 no. supplement 1, 14-14.
35. Tsui BMW, **Xu J**, Lee TS, A Civelek, I Valenta-Schindler, T Schindler. "Preliminary clinical evaluation of a cardiac motion vector field estimation method from 4D cardiac-gated myocardial perfusion PET images" J Nucl Med May 1, 2019 vol. 60 no. supplement 1, 305-305.
36. Lee TS, **Xu J**, Tsui BMW. "Development of transfer learning datasets using realistic simulation of myocardial perfusion SPECT images for a deep learning model" J Nucl Med May 1, 2019 vol. 60 no. supplement 1, 404-404.

Book chapter

1. BMW Tsui, T Feng, J Wang, **Xu J**, MR Abraham, SL Zimmerman, T Schindler, "Advances in 4D Gated Cardiac PET Imaging for Image Quality Improvement and Cardiac Motion and Contractility Estimation," Perspectives on Nuclear Medicine for Molecular Diagnosis and Integrated Therapy, pp 3-16, Springer, Japan
2. Tsui BMW, **Xu J**, A Rittenbach, JW Hugg, KB Parnham, "Development of a second-generation whole-body small-animal SPECT/MR imaging system," Hybrid Imaging in Cardiovascular Medicine. 57-74, CRC Press.

FUNDING

Extramural Funding

A. Active

R01EB013558 (MPI: Sgouros/Frey) 03/01/17-02/28/21 (NCE: 02/28/22)
NIBIB

Dose reduction in pediatric molecular imaging
Our overall objective is to reduce pediatric patient absorbed dose while maintaining and even improving the diagnostic quality of nuclear medicine images.

Role: Investigator

Total direct: 400K 20% effort

R21 EB029049 (PI: Taguchi) 01/22/20-11/30/21
NIBIB
Intra-operative 4-D soft tissue perfusion using no gantry rotation (IPEN)
The goal of the project is to develop a novel imaging technology and image reconstruction for providing tissue perfusion information during an interventional procedure.
Role: investigator
Total direct: 150K 2% effort

R03EB030653 (MPI: Xu/Shao) 08/10/21-05/31/23
NIBIB
Brain phantom generation by generative adversarial net (GAN) for AI-based emission tomography
The goal of the project is to generate brain phantom data that will be used as the ground-truth for improving PET and SPECT image reconstruction.
Role: PI/MPI
Total direct: 50K 13% effort

B. Completed

NIH/NIBIB (Tsui) 7/1/03-6/30/11
Title: CARDIAC SPECT W/ROTATING SLANT HOLE COLLIMATOR for 4D Clinical Gated Cardiac SPECT

The goal is to bring a novel three-dimensional SPECT imaging technique that has substantial advantage over conventional SPECT to a full clinical implementation and evaluation for improved detection of myocardial defect in myocardial perfusion (MP) SPECT and regional wall motion abnormalities in gated MP SPECT.
Role: co-investigator

NIH/NIBIB (Tsui) 7/1/03-6/30/13
Title: CORRECTIVE IMAGE RECONSTRUCTION METHODS FOR ECT

We propose to continue our ground-breaking work through further development of the 4D NCAT phantom for more realistic modeling of normal and abnormal respiratory anatomy and function. We will also extend our existing corrective image reconstruction methods from 2D and 3D to 4D with the goal of improving the detection of abnormalities.
Role: co-investigator

NIH/NHLBI (Taguchi) 6/1/08-5/31/11
Title: TIME RESOLVED CARDIAC COMPUTED TOMOGRAPHY WITH PATIENT DOSE REDUCTION

The long-term goal of this research is to develop the time resolved, low dose cardiac CT imaging. Specifically, we will develop algorithms that estimate the time-dependent motion vector field of the heart from the measured data and integrate it into the image reconstruction process.
Role: co-investigator

NIH/NIBIB (Tsui) 9/1/09-8/31/12
Title: HIGH RESOLUTION SPECT-MR FOR MOLECULAR IMAGING

We propose to develop, construct, and evaluate a prototype SPECT/MRI system for simultaneous high-resolution molecular SPECT/MR imaging of small animals, with the potential of further developing into a human brain SPECT/MRI system.
Role: co-investigator

Siemens-JHU research contract (Xu) 09/01/12-02/28/14
Title: Evaluation of image quality improvement and radiation dose reduction of advanced image reconstruction methods in X-ray CT.
The goal of this proposal is to systematically quantify the dose reduction capabilities of the SIEMENS SAFIRE (image reconstruction method) in routine clinical protocols using patient data and computer-generated lesion in the raw data domain.

Role: PI

Philips Research Contract (Tsui) 1/1/16-12/31/17
Title: Respiratory Motion Correction for clinical PET
The goal of the research contract is to evaluate the application of previously developed 4D image reconstruction methods with respiratory motion correction to anonymized PET patient data from Philips.
Role: co-investigator

AHA Grant-in-aid (Tsui) 7/1/16-6/30/18
Title: Novel Image Reconstruction and Analysis Methods for 4D Clinical Gated Cardiac PET
The goal of the research is to develop and apply the advanced 4D PET image reconstruction methods with respiratory motion correction and perform cardiac functional analysis.
Role: co-investigator

1R21 CA211035-01A1 (MPI: F Noo, J Xu) 08/01/17-07/31/20
NCI
Novel Reconstruction Paradigm for Multiphasic CT Imaging of Kidney Cancer
The goal of the project are (1) to develop novel algorithms that perform joint image reconstruction of multiphase CT scans and (2) to evaluate the image quality achieved with joint reconstruction of multiphase CT scans for the clinical application of kidney cancer.
Role: PI/MPI

Intramural Funding

A. Active

The Sol Goldman Pancreatic Cancer Research Center Award 01/01/21-12/31/21
Data-adaptive image reconstruction for improved CT imaging of pancreatic cysts
The goal of the project is to combine machine learning with model based image reconstruction methods for improved detection and classification of pancreatic cysts.
Role: PI
Total: 50K 50% effort

B. Completed

JHU Catalyst Award 08/01/19-07/30/21
Developing a computational pancreas model for CT imaging
The goal of the project to develop a computational model for the pancreas, so that we can evaluate in silico different CT imaging protocols and their impact on dose and image quality for pancreatic imaging.
Role: PI
Total: 75K 50% effort

CLINICAL ACTIVITIES

None

EDUCATIONAL ACTIVITIES

Teaching

Classroom instruction

Spring 2017	Lectured on 2-D image reconstruction from projections. Contributed to midterm exam preparation. Course title: Modern Biomedical Image Instrumentation and Techniques, EN.580.473.
Spring 2012,2013	Preparation and grading of three computer lab exercises. Course title: Modern Biomedical Image Instrumentation and Techniques, EN.580.472.

Mentoring

Pre-doctoral advisees/mentees

2011-2012 Fatma Elshahaby

2011-2016 Andrew Rittenbach, Tao Feng, Jizhe Wang – coadvised with Dr. Benjamin Tsui.

Thesis/GBO committe

2011-2016 Andrew Rittenbach, Tao Feng, Jizhe Wang

2021 Junyu Chen

Educational Program Building/Leadership

2021 Advisory committee – Joint Masters Program in Medical Physics, Radiology, SOM

RESEARCH ACTIVITIES

Research Focus

My area of expertise lies in developing iterative image reconstruction methods and task-based image quality evaluation for x-ray CT. The focus of my research has been on utilizing an appropriate data acquisition model and a statistical model to improve x-ray CT image quality. I have published on electronic noise compensation for low dose CT applications, statistical iterative image reconstruction methods for helical cone-beam CT utilizing symmetry in the source trajectory, CT truncation artifacts reduction using the data consistency conditions, and sparse-view image reconstruction method for interventional C-arm CT applications. Since 2011 I have been working with Siemens Healthcare and Siemens Medical Systems on image quality evaluation of statistical image reconstruction methods for x-ray CT. My research employs statistical machine learning methodologies, many of which lie at the foundation of the state-of-the art deep learning algorithms.

ORGANIZATIONAL ACTIVITIES

Advisory Committees, Review Groups/Study Sections

Scientific committee: 2018, 2020 International Conference on Image Formation in X-ray CT

Student award committee: 2021 International Meeting on Fully 3D Image Reconstruction in Radiology and Nuclear Medicine

Study section: 2020 EITA ad-hoc memeber

Journal peer reviewer

Physics in Medicine and Biology
Medical Physics
Journal of Medical Imaging
IEEE Signal Processing Letters
IEEE Transactions on Computational Imaging
IEEE Transactions on Image Processing
IEEE Transactions on Medical Imaging
IEEE Transactions on Nuclear Science

Conference abstract reviewers

2007-2019 IEEE Medical Imaging Conference (MIC)
2009 Fully3D Image reconstruction in Radiology and Nuclear Medicine
2018, 2020 International Conference on Image Formation in X-ray CT

Conference session chairs

2007 IEEE Medical Imaging Conference (MIC)
2012, 2014, 2018 International Conference on Image Formation in X-ray CT

RECOGNITION

Awards, Honors

Pan Wen-Yuan Scholarship, Stanford University, 1998.

Travel award, IEEE NSS and MIC workshop on the Nuclear Radiology of Breast Cancer, 2004.

Honorable mention, 2005 Annual meeting of the Society of Nuclear Medicine, Computer and Instrumentation Young Investigator Symposium.

Invited Talks

March 2012 Quantitative SPECT and PET reconstruction. In Vivo Preclinical Imaging: An introductory workshop, Johns Hopkins, Baltimore, MD

May 2012 Interior and Sparse-View Image Reconstruction Using a Mixed Region and Voxel Based ML-EM Algorithm. Department of Mathematics, The Chinese University of Hong Kong

OTHER PROFESSIONAL ACCOMPLISHMENTS

Presentations at National and International Conferences

1. **Xu J**, Liu C, Wang, YC, Frey, EC, and Tsui BMW, "Attenuation correction for rotating multi-segment slant-hole SPECT in breast imaging," Presented at the 2004 Workshop on the Nuclear Radiology of Breast Cancer, Oct 22-23, 2004, Rome, Italy.
2. **Xu J**, Liu C, and Tsui BMW, "MammoSPECT Using Rotating Slant-Hole Collimator Designs," presented at the 2006 Workshop on the Nuclear Radiology of Breast Cancer, Nov 4-5, 2006, San Diego, CA.
3. **Xu J** and Tsui BMW, "A Maximum-Likelihood Iterative Algorithm for X-Ray CT Reconstruction," presented at the 2006 IEEE NSS and MIC, Oct 29-Nov 5, 2006, San Diego, CA.
4. **Xu J** and Tsui BMW, "A Two-Step Hilbert Transform Method for Rotating Slant-Hole SPECT Reconstruction," presented at the 53rd Annual Meeting of the Society of Nuclear Medicine, Jun 2006, San Diego, CA.
5. **Xu J**, Liu C, and Tsui BMW. "Completeness conditions in rotating multi-segment variable slant angle SPECT technique," presented at the 54th Annual Meeting of the Society of Nuclear Medicine, Jun 2007, San Diego, CA.
6. **Xu J** and Tsui BMW. "Three dimensional limited-angle mammoSPECT reconstruction with total variation regularization," presented at the 55th Annual Meeting of the Society of Nuclear Medicine, Jun 2008, Washington DC.
7. **Xu J** and Tsui BMW, "Iterative volume of interest image reconstruction in helical cone beam X-Ray CT using a stored system matrix approach," SPIE Medical Imaging, Lake Buena Vista, Florida, Feb 12-16, 2011.
8. **Xu J**, S Chen, B Tsui, "Application of total-variation penalized maximum likelihood image reconstruction for dynamic small animal stationary SPECT studies," Society of Nuclear Medicine Annual meeting, June 4-8, 2011, San Antonio, Texas.
9. **Xu J** and Tsui BMW, "An analytical geometric calibration method for circular cone-beam CT geometry", 2nd International Conference on Image Formation in X-ray CT. Jun 22-25, 2012. Salt Lake City, UT.
10. **Xu J** and Tsui BMW, "Direct regional activity characterization in emission computed tomography (ECT) using a Gaussian mixture image representation model", Society of Nuclear Medicine Annual Meeting, Washington DC, June 10-15, 2014.
11. **Xu J,** FA Elshahaby, MK Fuld, GSK Fung, and Tsui BMW, "Application of task-based measures of image quality to evaluation of image reconstruction methods in x-ray CT", 3rd International Conference on Image Formation in X-ray CT. Jun 22-25, 2014. Salt Lake City, UT.
12. **Xu J**, A Rittenbach, A Fabbri, VO Cencelli, B Tsui. Pinhole SPECT image reconstruction using a dense system matrix, 2015 Fully 3-D image reconstruction in radiology and nuclear medicine, pp 375-378. Newport beach, Rhode Island, Jun 1-5 2015.
13. **Xu J**, B Tsui, F Noo, "A Feature-Preserving Image Reconstruction Method for Improved Pancreaticlesion Classification in Diagnostic CT Imaging," AAPM annual meeting, Washington DC. Aug 1-5, 2016.
14. **Xu J**, F Noo, B Tsui, "Image registration using convex relaxation and the ADMM algorithm," The 2017 International Conference on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine, Xi'an Shaanxi, China, June 18-23, 2017

15. **Xu J**, F Noo. “Joint image reconstruction for multiphase CT,” 5th International Conference on Image Formation in X-ray CT, May 20-23, 2018, Salt Lake City, Utah.
16. **Xu J**, F Noo. “Model based image reconstruction with concomitant scale estimation,” 5th International Conference on Image Formation in X-ray CT, May 20-23, 2018, Salt Lake City, Utah.
17. **Xu J**, F Noo. “Adaptive smoothing algorithms for MBIR in CT applications,” 15th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine; Jun 2-6, 2019, Philadelphia, PA.