FRED WHEELER

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Education

Rensselaer Polytechnic Institute — Troy, NY
Ph.D. in Electrical Engineering, Graduated September 2000, GPA 3.83

- Thesis title: "Trellis Source Coding and Memory Constrained Image Coding"
- Thesis topic: Low-memory fidelity-embedded wavelet-based image coding, bitplane coding using significance sets, scalable coding, trellis coded quantization
- Sun Microsystems Fellow, 1999–2000
- Research Assistantship in the Center for Digital Video and Media Research, 1998–1999
- Research Assistantship sponsored by ARPA, 1992–1994

Rensselaer Polytechnic Institute — Troy, NY
M.S. in Mathematics, Graduated December 1994, GPA 3.9

- Coursework emphasis in mathematical analysis

Worcester Polytechnic Institute — Worcester, MA
M.S. in Electrical Engineering, Graduated May 1992, GPA 3.9

- Image and Signal Processing and Numerical Methods research emphasis
- M.S. Thesis title: "Registration of Range Images and Synthetic Aperture Range Images"
- Robert H. Goddard Fellow, 1990–1991
- Research Assistantship sponsored by IBM Federal Sector Division, 1991-1992

Worcester Polytechnic Institute — Worcester, MA
B.S. in Electrical Engineering, Graduated May 1990 with Distinction, GPA 3.64, 3.94 (major)

- Communications and Signal Processing course work emphasis

Experience

GE Global Research Center — Niskayuna, NY
Electrical Engineer, October 2000–present

- GE Project Leader for control valve diagnostics research, 2012–. Developed strategy and led team to develop new data analysis and sensing methods for valve diagnostics. Developed several algorithms to assess specific aspect of valve health.
- GE Task Leader for analytics for fiber optic monitoring (distributed temperature, strain, and acoustic) of subsea risers and flow lines. Worked with project leads team to create overall strategy and define analytics needs. Led small team to develop algorithms and data analysis methods. Developed algorithms and proof-of-concept analysis for riser leak and fatigue detection and monitoring.

- Developed a novel model and model fitting process for the automated interpretation of seismic faults in 3D seismic data.
- Principle Investigator for DOJ National Institute of Justice program "Multimodal Biometric Fusion with Predictive Quality Metrics," (2007-MU-CX-K001) 2007–2009. Led development of new mathematical models and algorithms for biometric fusion.
- Principle Investigator for DOJ National Institute of Justice program "Active 3D Face Capture," (2006-IJ-CX-K045) 2006–2007. Led development of advanced face modeling algorithms and a biometric surveillance face capture system.
- Lead role (not PI) for DOJ National Institute of Justice program "High Quality 3D Facial Images from Surveillance Video," (2005-IJ-CX-K060) 2005–2006. Developed face modeling technology and facial image super-resolution algorithms.
- GE Project Leader for collaborative biometrics programs with Lockheed Martin, $3M+, 2007–. Led teams developing biometrics technology for fusion, face recognition at a distance, person detection, facial modeling, and re-identification.
- Project leader for small team that developed a prototype stand-off iris capture and recognition system.
- Developed algorithms for spatial-domain image super-resolution of moving and 3D objects, and frequency-domain super-resolution techniques for aerial surveillance.
- Developed techniques for *Computed Spectroscopy* - an image processing approach to reconstruct hyper-spectral imagery form specialized panchromatic observations.
- Led Mammography CAD project to develop new methods for image enhancement for x-ray digital breast tomosynthesis. Work produced several patent applications.
- Performed due diligence investigations of data compression companies.

Rensselaer Polytechnic Institute, ECSE Dept. — Troy, NY
Adjunct Assistant Professor, Spring 2001

- Taught graduate Detection and Estimation course (ECSE 6520)
- Prepared and gave lectures, wrote and corrected homework assignments and tests

Rensselaer Polytechnic Institute, ECSE Dept. — Troy, NY
Course Instructor, Summer 1999

- Taught Junior-level undergraduate Linear Systems course (ECSE 2410)
- Prepared and gave lectures, wrote and corrected homework assignments and tests, helped students individually, received excellent reviews from students in the class

GE Global Research Center, Electronic Systems Lab — Niskayuna, NY
Electrical Engineer, 1994–1998 (concurrent with Ph.D. program)

- Generated analytic and numerical solutions for a variety of estimation and optimization problems relating to phased-array antenna design and calibration

Professional Service

- Vice Chair IEEE Signal Processing Society, Schenectady Section
- IEEE BTAS Program Committee (biometrics)

- IEEE IJCB 2011 Program Committee (biometrics)
- Reviewer for ICASSP, ICIP, IEEE Transactions on Image Processing

Other Items

- Sun Microsystems Fellow, 1999–2000, full graduate support
- Robert H. Goddard Fellow, 1990–1991, full graduate support
- Tau Beta Pi Engineering Honor Society, 1989
- Eta Kappa Nu Electrical Engineering Honor Society, 1988
- Issued a United States DoD Interim Secret Clearance, 1998
- Issued a United States TS SCI Clearance, 2006

Book Chapters

[1] **Frederick W. Wheeler**, Xiaoming Liu, and Peter H. Tu. *Handbook of Face Recognition*, chapter Face Recognition at a Distance. Springer, 2nd edition, 2011.

[2] Peter H. Tu, Glen W. Brooksby, Gianfranco Doretto, Donald W. Hamilton, Nils Krahnstoever, J. Brandon Laflen, Xiaoming Liu, Kedar A. Patwardhan, Thomas Sebastian, Yan Tong, Jilin Tu, **Frederick W. Wheeler**, Christopher M. Wynnyk, Yi Yao, and Ting Yu. *Distributed Video Sensor Networks*, chapter Video Analytics for Force Protection. Springer, 2011.

Articles

[1] Yan Tong, Xiaoming Liu, **Frederick W. Wheeler**, and Peter H. Tu. Semi-supervised facial landmark annotation. *Computer Vision and Image Understanding*, April 2012.

[2] Brian Redman, John Novotny, Taylor Grow, Van Rudd, Nathan Woody, Michael Hinckley, Paul McCumber, Nathan Rogers, Michael Hoening, Kelli Kubala, Scott Shald, Radek Uberna, Tiffanie D'Alberto, Thomas Höft, Russell Sibell, and **Frederick W. Wheeler**. 2D+3D face imaging for stand-off biometric identification. In *Conference on Lasers and Electro-Optics (CLEO)*, Baltimore, MD, May 2011.

[3] **Frederick W. Wheeler**, Richard L. Weiss, and Peter H. Tu. Face recognition at a distance system for surveillance applications. In *Proc. of the IEEE Conf. on Biometrics: Theory, Applications, and Systems (BTAS)*, Washington DC, September 2010.

[4] Xiaoming Liu, Yan Tong, **Frederick W. Wheeler**, and Peter H. Tu. Facial contour labeling via congealing. In *Proc. of the European Conf. on Computer Vision (ECCV)*, Crete, Greece, September 2010.

[5] Xiaoming Liu, Yan Tong, and **Frederick W. Wheeler**. Simultaneous alignment and clustering for an image ensemble. In *Proc. of the Intl. Conf. on Computer Vision (ICCV)*, Kyoto, Japan, October 2009.

[6] Yan Tong, Xiaoming Liu, **Frederick W. Wheeler**, and Peter Tu. Automatic facial landmark labeling with minimal supervision. In *Proc. of the IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, Miami, FL, June 2009.

[7] Necmiye Ozay, Yan Tong, **Frederick W. Wheeler**, and Xiaoming Liu. Improving face recognition with a quality-based probabilistic framework. In *IEEE Computer Society Workshop on Biometrics (In association with CVPR 2009)*, Miami, FL, June 2009.

[8] **Frederick W. Wheeler**, A. G. Amitha Perera, Gil Abramovich, Bing Yu, and Peter H. Tu. Stand-off iris recognition system. In *Proc. of the IEEE Conf. on Biometrics: Theory, Applications, and Systems (BTAS)*, Washington DC, September 2008.

[9] **Frederick W. Wheeler**, Xiaoming Liu, and Peter H. Tu. Multi-frame super-resolution for face recognition. In *Proc. of the IEEE Conf. on Biometrics: Theory, Applications, and Systems (BTAS)*, Washington DC, September 2007.

[10] **Frederick W. Wheeler**, Xiaoming Liu, Peter H. Tu, and Ralph T. Hoctor. Multi-frame image restoration for face recognition. In *Proc. of the IEEE Signal Processing Society: Workshop on Signal Processing Applications for Public Security and Forensics (SAFE)*, Washington D.C., April 2007.

[11] **Frederick W. Wheeler** and Anthony J. Hoogs. Moving vehicle registration and super-resolution. In *Proc. of the IEEE Applied Imagery Pattern Recognition Workshop*, Washington D.C., October 2007.

[12] Peter H. Tu, Gianfranco Doretto, Nils O. Krahnstoever, A. G. Amitha Perera, **Frederick W. Wheeler**, Xiaoming Liu, Jens Rittscher, Thomas B. Sebastian, Ting Yu, and Kevin G. Harding. An intelligent video framework for homeland protection. In E. M. Carapezza, editor, *Proc. of the SPIE Defense & Security Symposium, Conference on Unattended Ground, Sea, and Air Sensor Technologies and Applications IX*, Orlando, Florida, April 2007.

[13] Xiaoming Liu, **Frederick Wheeler**, and Peter Tu. Improved face model fitting on video sequences. In *Proc. of the British Machine Vision Conference (BMVC)*, University of Warwick, UK, September 2007.

[14] **Frederick W. Wheeler**, A. G. Amitha Perera, Bernhard E. Claus, Serge L. Muller, Gero Peters, and John P. Kaufhold. Micro-calcification detection in digital tomosynthesis mammography. In *SPIE Symposium on Medical Imaging, Conference on Image Processing*, San Diego, CA, February 2006.

[15] Ralph T. Hoctor, **Frederick W. Wheeler**, and Eamon B. Barrett. Optical array aspects of computed spectroscopy. In *Fourth IEEE Workshop on Sensor Array and Multi-channel Processing (SAM)*, Waltham, MA, July 2006.

[16] Ralph T. Hoctor, **Frederick W. Wheeler**, and Eamon B. Barrett. Computed spectroscopy using segmented apertures. In *IS&T/SPIE Symposium on Electronic Imaging, Conference on Computational Imaging*, San Jose, CA, January 2006.

[17] Xiaoming Liu, Peter H. Tu, and **Frederick W. Wheeler**. Face model fitting on low resolution images. In *Proc. of the British Machine Vision Conference (BMVC)*, Edinburgh, UK, September 2006.

[18] **Frederick W. Wheeler**, Ralph T. Hoctor, and Eamon B. Barrett. Super-resolution image synthesis using projections onto convex sets in the frequency domain. In *SPIE Conf. on Computational Imaging III*, San Jose, CA, January 2005.

[19] G. Peters, S. Muller, S. Bernard, R. Iordache, **F. Wheeler**, and I. Bloch. Reconstruction-independent 3D CAD for calcification detection in digital breast tomosynthesis using fuzzy particles. In *Proceedings of the 10th Iberoamerican Congress on Pattern Recognition (CIARP)*, November 2005.

[20] Nithin Nagaraj, Sudipta Mukhopadhyay, **Frederick Wheeler**, and Ricardo S. Avila. Region of interest and windowing based progressive image transmission using JPEG2000. In *Proc. of SPIE Vol. #5033, Medical Imaging*, San Diego, CA, February 2003.

[21] Seth D. Silverstein, Jeffrey M. Ashe, Gregory M. Kautz, **Frederick W. Wheeler**, and Anthony W. Jacomb-Hood. Tripulse: A system for determining orientation and attitude of a satellite borne active phased array. *IEEE Trans. on Aerospace and Electronics Systems*, 38(1):2–12, January 2002.

[22] **Frederick W. Wheeler** and William A. Pearlman. SPIHT image compression without lists. In *Proc. of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 2047–2050, Istanbul, Turkey, June 2000.

[23] **Frederick W. Wheeler** and William A. Pearlman. Combined spatial and subband block coding of images. In *Proc. of the International Conference on Image Processing (ICIP)*, volume 3, pages 861–864, Vancouver, Canada, September 2000.

[24] **Frederick W. Wheeler** and William A. Pearlman. Low-memory packetized SPIHT image compression. In Michael B. Matthews, editor, *Conf. Record of The Thirty-Third Asilomar Conf. on Signals, Systems & Computers*, volume 2, pages 1193–1197, Pacific Grove, CA, October 1999.

[25] Seth D. Silverstein, Jeffrey M. Ashe, Gregory M. Kautz, and **Frederick W. Wheeler**. Tripulse: An accurate orientation/attitude estimation system for satellite borne phased arrays. In *Proc. of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, volume 4, pages 1921–1924, Seattle, WA, May 1998.

[26] **Frederick W. Wheeler**, Richard F. Vaz, and David Cyganski. Automated registration of terrain range images using surface feature level sets. In *Visual Communications and Image Processing '91: Image Processing*, volume Proc. of SPIE 1606, pages 78–85, 1991.

Theses

[1] **Frederick W. Wheeler**. *Trellis Source Coding and Memory Constrained Image Coding*. PhD thesis, Rensselaer Polytechnic Institute, Troy, NY, September 2000.

[2] **Frederick W. Wheeler**. The registration of range images and synthetic aperture range images of terrain scenes. Master's thesis, Worcester Polytechnic Institute, Worcester, MA, May 1992.

General Interest Publications

[1] **Frederick W. Wheeler**, Peter H. Tu, and Xiaoming Liu. Recognize the face. *TechBeat*, page 4, Winter 2008.

[2] P. Tu, **F. Wheeler**, N. Krahnstoever, T. Sebastian, J. Rittscher, X. Liu, A. Perera, and G. Doretto. Surveillance video analytics for large camera networks. In *SPIE Newsroom*, 2007.

Issued Patents

[1] Harold Randall Smart, Edward James Nieters, and **Frederick Wilson Wheeler**. System to monitor performance of packing material in a seal. U.S. Patent 9,304,053, August 2013.

[2] Yi Xu, **Frederick Wilson Wheeler**, and Bernhard Erich Hermann Claus. System and method for X-ray image acquisition and processing. U.S. Patent 9,194,965, November 2012.

[3] Daniel Curtis Gray, Kevin George Harding, **Frederick Wilson Wheeler**, and Gil Abramovich. Apparatus and method for image super-resolution using integral shifting optics. U.S. Patent 9,025,067, October 2013.

[4] Gil Abramovich, Kevin George Harding, Joseph Czechowski III, and **Frederick Wilson Wheeler**. Apparatus and method for contactless high resolution handprint capture. U.S. Patent 8,971,588, March 2011.

[5] **Frederick Wilson Wheeler**. Compression of electrocardiograph signals. U.S. Patent 8,606,351, December 2011.

[6] Jilin Tu, **Frederick Wilson Wheeler**, Peter Henry Tu, Xiaoming Liu, and Yan Tong. Optimal subspaces for face recognition. U.S. Patent 8,498,454, July 2009.

[7] Xiaoming Liu, **Frederick Wilson Wheeler**, Peter Henry Tu, and Jilin Tu. Optimal gradient pursuit for image alignment. U.S. Patent 8,478,077, March 2011.

[8] Weizhong Yan, **Frederick W. Wheeler**, Peter H. Tu, and Xiaoming Liu. Assessing biometric sample quality using wavelets and a boosted classifier. U.S. Patent 8,442,279, June 2009.

[9] Yan Tong, Xiaoming Liu, Jilin Tu, Peter Henry Tu, and **Frederick Wilson Wheeler**. System and method for automatic landmark labeling with minimal supervision. U.S. Patent 8,442,330, July 2009.

[10] **Frederick W. Wheeler** and Anthony J. Hoogs. Super-resolving moving vehicles in an unregistered set of video frames. U.S. Patent 8,290,212, July 2008.

[11] Xiaoming Liu, Peter H. Tu, and **Frederick W. Wheeler**. Methods involving face model fitting. U.S. Patent 8,224,037, April 2008.

[12] Xiaoming Liu, Peter H. Tu, and **Frederick W. Wheeler**. Generic face alignment via boosting. U.S. Patent 8,155,399, March 2008.

[13] **Frederick W. Wheeler**, Xiaoming Liu, and Peter H. Tu. System and method for reconstructing restored facial images from video. U.S. Patent 8,064,712, August 2007.

[14] Bernhard E. H. Claus, **Frederick W. Wheeler**, Mark L. Grabb, and Cynthia E. Landberg. System and method for anatomy based reconstruction. U.S. Patent 7,978,886, September 2005.

[15] Xiaoming Liu, **Frederick W. Wheeler**, and Peter H. Tu. Method of combining images of multiple resolutions to produce an enhanced active appearance model. U.S. Patent 7,885,455, January 2007.

[16] **Frederick W. Wheeler** and Siavash Yazdanfar. Iris imaging system and method for the same. U.S. Patent 7,824,034, September 2007.

[17] **Frederick W. Wheeler**, Bernhard E. H. Claus, John P. Kaufhold, Jeffrey W. Eberhard, Mark L. Grabb, and Cynthia E. Landberg. Method and system for volumetric comparative image analysis and diagnosis. U.S. Patent 7,653,263, June 2005.

[18] Ralph T. Hoctor and **Frederick W. Wheeler**. Imaging spectroscopy based on multiple panchromatic images obtained from an imaging system with an adjustable point spread function. U.S. Patent 7,385,705, June 2006.

[19] Somasekhar Dhavala and **Frederick W. Wheeler**. System and method for coding data. U.S. Patent 7,123,774, November 2002.

[20] Seth D. Silverstein, Jeffrey M. Ashe, Gregory M. Kautz, **Frederick W. Wheeler**, and Anthony W. Jacomb-Hood. Method for determining orientation and attitude of a satellite- or aircraft-bourne phased-array antenna. U.S. Patent 5,790,071, August 1998.

Many of the publications listed above are available at `http://http://www.fredwheeler.org`.