Yilong MA

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Expertise

Medical Imaging, Imaging Science, Digital Signal Processing, Image Reconstruction
3-D Image Processing and Analysis, Simulation and Modeling, Numerical Analysis
Statistics, Applied Physics, Electromagnetism, Biomedical Engineering, Radiology
Nuclear Medicine, PET, SPECT, MR, CT, Mammography, Ultrasound, EEG/MEG
Unix, X Window, Vms, Computer Programming and Graphics, C, Fortran, Matlab

Objective

A challenging research & development position in academic or industry specialized in the design and application of medical electronic, diagnostic and imaging systems

Education

1998	**PhD**	Biomedical Engineering, McGill University, Montreal, Quebec
1990	**MSc**	Semiconductor Physics, Queen's University, Kingston, Ontario
1985	**BSc**	Solid State Physics, Lanzhou University, Lanzhou, PR China

Professional Experience

SEPT. 1990 - PRESENT   MEDICAL IMAGING SPECIALIST
MCCONNELL BRAIN IMAGING CENTER, MONTREAL NEUROLOGICAL INSTITUTE & HOSPITAL

- Developed and implemented a 3-D computer simulation system to model data acquisition and image reconstruction of a positron emission tomography.
- Conducted PET phantom experiments to calibrate/validate simulation algorithms that include 3-D sampling geometry and detector response, detection efficiency and deadtime, photon attenuation, scatter, randoms, and counting statistics.
- Modified and installed reconstruction programs on GE's brain (PC2048-15B) and body (PC4096-15WB) PET scanners to analyze/reconstruct real and simulated projection data. Improved scatter and attenuation correction algorithms.
- Performed simulation studies to evaluate image distortions in PET emission and transmission scans using anatomy-based brain models from MR/CT images. Compared different scatter and attenuation correction methods.
- Conducted MR/PET phantom scans to characterize the spatial variability of regional bias and variance in CBF and FDG images. Developed methods to optimize image reconstruction parameters and region of interest analysis.

- Wrote 3-D image processing and modeling programs in network-based computing environment. Developed X window graphics tools to analyze and visualize 4-D medical data. Performed numerical computations in both time and frequency domains.

- Translated the PET scanner's image reconstruction program (Vms Fortran) to C and implemented the code on Unix computers. Ported a CT simulation and reconstruction system (SNARK89) from SUN to SGI. Performed C-Fortran-Matlab interface programming on SUN/SGI platforms.

- Collaborated in the following application projects using the PET simulation system:

  - evaluation and in vivo correction of 3-D partial volume effects in regional time activity curves from dynamic PET images, using co-registered MR scans of the same brain;
  - development of statistical iterative PET image reconstruction algorithms incorporating correlated structural information from MRI data;
  - study of the signal-to-noise issues in PET activation scans and design of optimal imaging protocols;
  - evaluation and optimization of data collection strategy and kinetic parameter estimation algorithms;
  - validation of the accuracy of multi-modality registration algorithms between PET, SPECT, MR and CT images.

- Assisted in performing PET, SPECT and MR scans of physical brain phantoms to validate these projects. Acquired training and practice in quality assurance of medical imaging systems, preparation and safe handling of radioactive substance and contrast agent.

- Installed and verified the PET simulation programs at the Johns Hopkins University Hospital to correct partial volume distortions in radioligand neuroreceptor imaging of patients and controls.

- Improved 3-D medical imaging tools for tissue classification, structure segmentation, image registration/integration, and correlation analysis of dynamic PET images with anatomical regions of interest from MRI data.

Jan. 1988 - Aug. 1990 Research and Teaching Assistants
Department of Physics & Solid State Physics Lab, Queen's University

- Assisted in expanding a research facility to study electron transport and photo-excitation processes in semiconductor micro-structures. Performed dedicate experiments to measure electron mobility, temperatures, energy-loss rates and thermoelectric power in GaAs-based heterostructures, under light illumination and low frequency electromagnetic fields.

- Worked on electronic instrumentation, computer-aided data acquisition, digital signal processing and numerical analyses. Operated and maintained low temperature (1 K), strong magnetic field (8 T) and high vacuum systems.

- Supervised undergraduate students in the first and second year experimental physics courses. Taught tutorial sessions, marked lab reports and assignments. Assisted two MSc candidates to complete their experiments.

Sept. 1985 - Dec. 1987 Research and Teaching Assistants
Physics Department & Magnetic Materials Institute, Lanzhou University

- Set up and improved electromagnetic measurement apparatus to characterize and calibrate newly fabricated magnetic recording medium. Taught the fourth year physics majors class to conduct the experiments and graded lab reports. Supervised two BSc students to finish their graduation projects and theses.

Computational Skills

- Languages: C, C++, Fortran, Unix Scripts, Matlab, Basic, Pascal
- Environment: UNIX, IRIX, VMS, X-Windows, MS-DOS/Windows
- Hardware: SGI (Indy/Iris/Indigo), SUN, VAX, Mainframe, PC, Mac
- Software: Emacs, Latex, Showcase, MS-Word/Excel, Internet Utility

Professional Affiliation

1994 - present: IEEE Engineering in Medicine and Biology Society

Publications

1. Y. Ma, O. Rousset and A.C. Evans. A generalized methodology for partial volume correction in emission tomography. IEEE Nucl. Sci. Symp. Med. Imag. Conf., Toronto, Canada, Nov. 1998.

2. Y. Ma, O. Rousset and A.C. Evans. Influence of image acquisition and reconstruction parameters on the topology of brain activation patterns with PET. **NeuroImage** 7: S642, 1998. 4th Int. Conf. Human Brain Mapping, Montreal, Canada, June 1998.

3. A. Dagher, C. Bleicher, J. Aston, K.J. Worsley, Y. Ma and A.C. Evans. Measuring neurotransmitter release with PET. **NeuroImage** 7: S27, 1998. 4th Int. Conf. Human Brain Mapping, Montreal, Canada, June 1998.

4. J.A.D. Aston, A. Dagher, K.J. Worsley, Y. Ma and A.C. Evans. Measuring neurotransmitter release with PET: simulation studies. **NeuroImage** 7: A64, 1998. 2nd Int. Symp. Functional Neuroreceptor Mapping of Living Brain, Ann Arbor, USA, June 1998.

5. O. Rousset, Y. Ma, and A.C. Evans. Correction for partial volume effects in PET: principle and validation. **J Nucl Med** 39: 904-911, 1998.

6. O. Rousset, Y. Ma, D.F. Wong, and A.C. Evans. Pixel verses ROI based partial volume correction in PET. In: Quantification of brain function using PET. R.E. Carson, M.E. Daube-Witherspoon and P. Herscovitch, editors. San Diego: Academic Press; 1998: in press.

7. Y. Ma, and A.C. Evans. Analytical modeling of PET imaging with correlated functional and structural images. **IEEE Trans Nucl Sci** 44: 2439-2444, 1997.

8. Y. Ma, and A.C. Evans. Analytical modeling of PET imaging with correlated functional and structural images. Proc. IEEE Nucl. Sci. Symp. Med. Imag. Conf.: 1817-1821, Anaheim, USA, Nov. 1996.

9. O. Rousset, Y. Ma, D.F. Wong, and A.C. Evans. Pixel verses ROI based partial volume correction in PET. **NeuroImage** 5: S33, 1997. Brain PET: Bethesda, USA, June 1997.

10. Y. Ma, and A.C Evans. A 3-D simulation system for objective evaluation of quantitative imaging characteristics in PET scans. **J Nucl Med**: submitted Sept. 1996.

11. W. Gu, Y. Ma, and A.C. Evans. Tracer-independent MR/PET image registration algorithm based on PET transmission data. **IEEE Trans Med Imag**: submitted Sept. 1996.

12. Y. Ma, Y. Zhang, K. Murase and A.C. Evans. Iterative reconstruction of PET images using prior tissue classification and biodistribution information. **IEEE Trans Med Imag**: submitted Sept. 1996.

13. J. Moreno-Cantu, Y. Ma, C.J. Thompson, R.J. Zatorre, and M. Petrides. An evaluation of localization precision of activation foci by identifying local maxima in subtracted head images. **IEEE Trans Med Imag**: submitted March 1996.

14. Y. Ma, and A.C. Evans. Spatial variability of regional radioactivity quantitation in blood flow and metabolic PET brain scans. **J Nucl Med** 37: 222P, 1996. 43rd Annual Meeting of the Society of Nuclear Medicine: Denver, USA, June 1996.

15. K. Murase, Y. Zhang, Y. Ma, and A.C. Evans. Usefulness of a newly developed MRI-constrained PET image reconstruction method. **J Nucl Med** 37: 223P, 1996. 43rd Annual Meeting of the Society of Nuclear Medicine: Denver, USA, June 1996.

16. Y. Ma, and A.C Evans. A scanner specific sinogram model for PET image reconstruction. Proc. 17th Ann. Int. Conf. IEEE-EMBS: 523-524, Montreal, Canada, Sept. 1995.

17. O. Rousset, Y. Ma, S. Marenco, D.F. Wong, and A.C. Evans. In vivo correction for partial volume effects in PET: accuracy and precision. **NeuroImage** 2: S33, 1995. Brain PET: Oxford, England, July 1995.

18. O. Rousset, Y. Ma, S. Marenco, D.F. Wong, and A.C. Evans. In vivo correction for partial volume effects in PET: accuracy and precision. In: Quantification of brain function using PET. R. Myers, V. Cunningham, D. Bailey and T. Jones, editors. San Diego: Academic Press; 1996: 158-165.

19. D.F. Wong, J. Harris, H. Singer, S. Naidu, F. Yokoi, S. Marenco, A. Evans, O. Rousset, and Y. Ma. Dopamine receptor transporter imaging in neuropsychiatric developmental disorders. **J Cereb Blood Flow Metab** 15: S97, 1995. 17th Int. Symp. Cereb. Blood Flow Metab: Cologne, Germany, July 1995.

20. Y. Ma, O. Rousset and A.C Evans. A computationally efficient method to evaluate and optimize reconstruction parameters and data analysis of PET images. **Medical Physics** 22: 669, 1995. Proceedings COMP Conference: 93-94, Montreal, Canada, June 1995.

21. O. Rousset, Y. Ma, S. Marenco, D.F. Wong, and A.C. Evans. MRI-based correction for partial volume effects in PET: validation using a 3-D brain phantom. **Medical Physics** 22: 668, 1995. Proceedings COMP Conference: 83-84, Montreal, Canada, June 1995.

22. E. Lu, E. Meyer, H. Kuwabara, Y. Ma, M. Shiraishi, and A.C. Evans. Reduction of radiation absorbed dose in F-Dopa PET studies by hydration-induced voiding. **J Nucl Med** 36: 98P, 1995. 42nd Annual Meeting of the Society of Nuclear Medicine: Minneapolis, USA, June 1995.

23. S. Marenco, O. Rousset, Y. Ma, F. Yokoi, B. Chan, S. Kim, A.C. Evans, A.H. Gjedde, and D.F. Wong. Partial volume correction of kinetic curves in human dopamine transporter PET imaging. **J Nucl Med** 36: 254P, 1995. 42nd Annual Meeting of the Society of Nuclear Medicine: Minneapolis, USA, June 1995.

24. O. Rousset, Y. Ma, G. Leger, A.H. Gjedde, and A.C. Evans. Correction for partial volume effects in PET using MRI-based 3-D simulations of human brain metabolism. **Ann Nucl Med** 7: S31-S32, 1993. Brain PET: Akita, Japan, May 1993.

25. O. Rousset, Y. Ma, G. Leger, A.H. Gjedde, and A.C. Evans. Correction for partial volume effects in PET using MRI-based 3-D simulations of human brain metabolism. In: Quantification of brain function: tracer kinetics and image analysis in brain PET. K. Uemura, N.A. Lassen, T. Jones and I. Kanno, editors. Amsterdam: Elsevier; 1993: 113-123.

26. Y. Ma, M. Kamber, and A.C. Evans. 3-D simulation of PET brain images using segmented MRI data and positron tomograph characteristics. 3-D Advanced Image Processing in Medicine - 14th Ann. Int. Conf. IEEE-EMBS: 141-145, Rennes, France, Nov. 1992.

27. Y. Ma, M. Kamber, and A.C. Evans. 3-D simulation of PET brain images using segmented MRI data and positron tomograph characteristics. **Comput Med Imag Graph** 17: 365-371, 1993.

28. O. Rousset, Y. Ma, M. Kamber, and A.C. Evans. 3-D simulations of radiotracer uptake in deep gray matter structures of human brain. 3-D Advanced Image Processing in Medicine - 14th Ann. Int. Conf. IEEE-EMBS: 167-171, Rennes, France, Nov. 1992.

29. O. Rousset, Y. Ma, M. Kamber, and A.C. Evans. 3-D simulations of radiotracer uptake in deep gray matter structures of human brain. **Comput Med Imag Graph** 17: 373-379, 1993.

30. P. Neelin, J. Crossman, D.J. Hawkes, Y. Ma, and A.C. Evans. Validation of an MRI/PET landmark registration method using 3-D simulated PET images and point simulations. 3-D Advanced Image Processing in Medicine - 14th Ann. Int. Conf. IEEE-EMBS: 73-77, Rennes, France, Nov. 1992.

31. P. Neelin, J. Crossman, D.J. Hawkes, Y. Ma, and A.C. Evans. Validation of an MRI/PET landmark registration method using 3-D simulated PET images and point simulations. **Comput Med Imag Graph** 17: 351-356, 1993.

32. Y. Zhang, Y. Ma, and A.C Evans. Image reconstruction for PET using anatomical information. **Medical Physics** 20: 1591, 1993. Proceedings COMP/CMBES Joint Conference: 162-163, Ottawa, Canada, May 1993.

33. O. Rousset, Y. Ma, G. Leger, A.H. Gjedde, and A.C. Evans. In vivo correction for resolution effects in PET studies of the human brain. **Medical Physics** 20: 1592, 1993. Proceedings COMP/CMBES Joint Conference: 164-165, Ottawa, Canada, May 1993.

34. Y. Ma, M. Kamber, O. Rousset, and A.C. Evans. A MRI-based 3-D brain phantom for quantitative PET imaging. **Medical Physics** 19: 844, 1992. 34th Annual Meeting of the American Association of Physicists in Medicine: Calgary, Canada, Aug. 1992.

35. Y. Ma, R. Fletcher, E. Zaremba, M.D'Iorio, C.T. Foxon, and J.J. Harris. Energy-loss rates of 2-D electrons at a $GaAs/Al_xGa_{1-x}As$ interface. **Physics Review B** 43: 9033-9044, 1991.

36. Y. Ma, R. Fletcher, E. Zaremba, M.D'Iorio, C.T. Foxon, and J.J. Harris. Effect of second subband occupancy on energy relaxation of electrons in a 2-D gas at $GaAs/Al_xGa_{1-x}As$ heterojunctions at low temperatures. 8th Int. Conf. on 2-D Electronic Systems: Grenoble, France, Sept. 1989. **Surface Science** 229: 80-82, 1990.

References available upon request