

James G. Malcolm

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Education

Georgia Institute of Technology, Atlanta, GA

PhD Electrical and Computer Engineering, October 2010

- Concentration: Computer Vision
- Advisors: Yogesh Rathi and Allen Tannenbaum

MS Electrical and Computer Engineering, August 2008

- Concentration: Systems and Control

MS Computer Science, May 2006

- Concentration: Programming Languages, Operating Systems

BS Discrete Mathematics, May 2006

- Thesis: Back and Forth Error Correction on Quad-Tree Meshes
- Advisor: Yingjie Liu
- Highest honors

BS Computer Science, December 2004

- Concentration: Programming Languages, Operating Systems
 - Highest honors
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Work Experience

AccelerEyes. (VP Engineering, co-founder) Development of software enabling easy parallel programming. (Fall 2007-present)

Psychiatry Neuroimaging Laboratory, Harvard Medical School. (Research Fellow) Techniques to estimate neural tissue micro-structure. (Fall 2008 - Spring 2010)

CellularEyes. (co-founder) Development of software enabling easy storage and analysis of microscopy data. (Fall 2007-present)

Diagis. (Engineer) Implementation of research-level programming language techniques for security analysis of commercial languages. (Spring 2007)

Independent Consultant. Development of target tracking systems under the direction of my advisor Allen Tannenbaum. Contracts have been with Boeing, MZA Associates Corp (mza.com), and the Optical Sciences Company (tosc.com). (2005-2007)

Citizenship: US

Publications

International Journals and Book Chapters

- [1] S. Lienhard, J. Malcolm, C.-F. Westin, and Y. Rathi. A full bi-tensor neural tractography algorithm using the unscented Kalman filter. *J. on Advances in Signal Processing*, 77, 2011.
- [2] T. Larsen, G. Pryor, and J. Malcolm. Jacket: GPU Powered MATLAB Acceleration Jacket. In *GPU Gems*, chapter 28, pages 387–398. 2011.

- [3] H. P. Ng, M. Kubicki, Y. Rathi, P. Pelavin, J. Malcolm, D. Lucia, M. Niznikiewicz, R. W. McCarley, R. Kikinis, and M. E. Shenton. Abnormalities in inter-hemispheric white matter connections between bilateral superior temporal gyrus gray matter in chronic Schizophrenia. *In submission*.
- [4] P. Fillard, M. Descoteaux, A. Goh, S. Gouttard, B. Jeurissen, J. Malcolm, A. Ramirez, M. Reisert, K. Sakaie, F. Tensaouti, T. Yo, J.-F. Mangin, and C. Poupon. Quantitative evaluation of 10 tractography algorithms on a realistic diffusion MR phantom. *NeuroImage*, 56(1):220–234, 2011.
- [5] J. G. Malcolm, Y. Rathi, and C.-F. Westin. Processing and visualization of diffusion MRI. In T. Deserno, editor, *Recent Advances in Biomedical Image Processing and Analysis*, chapter 16, pages 403–424. Springer, 2011.
- [6] J. G. Malcolm, M. E. Shenton, and Y. Rathi. Filtered multi-tensor tractography. *Trans. on Med. Imag.*, 29:1664–1675, 2010.
- [7] Y. Rathi, J. G. Malcolm, S. Bouix, C.-F. Westin, and M. E. Shenton. Probabilistic classification of schizophrenic patients using diffusion tensor imaging. *In submission*.
- [8] J. G. Malcolm, O. Michailovich, S. Bouix, C.-F. Westin, M. E. Shenton, and Y. Rathi. A filtered approach to neural tractography using the Watson directional function. *Medical Image Analysis*, 14:58–69, 2010.
- [9] Y. Rathi, J. G. Malcolm, O. Michailovich, C.-F. Westin, M. E. Shenton, and S. Bouix. Tensor-kernels for simultaneous fiber model estimation and tractography. *Magnetic Resonance in Medicine*, 64(1):138–148, 2010.
- [10] N. Y. R. Agar, J. G. Malcolm, V. Mohan, H. W. Yang, M. D. Johnson, A. Tannenbaum, J. N. Agar, and P. M. Black. Imaging of meningioma progression by matrix-assisted laser desorption ionization time-of-flight mass spectrometry. *Analytic Chemistry*, 82(7):2621–5, Apr 2010.
- [11] Y. Rathi, J. Malcolm, S. Bouix, A. Tannenbaum, and M. E. Shenton. Affine registration of label maps in Label Space. *J. of Computing*, 2(4):1–11, 2010.
- [12] P. Vela, A. Betser, J. Malcolm, and A. Tannenbaum. Vision-based range regulation of a leader-follower formation. *Trans. on Control Systems Technology*, 17(2):442–448, 2009.
- [13] T. Georgiou, O. Michailovich, Y. Rathi, J. Malcolm, and A. Tannenbaum. Distribution metrics and image segmentation. *Linear Algebra and its Applications*, 2(425):663–672, 2007.

International Conference Proceedings

- [1] Y. Rathi, J. Malcolm, O. Michailovich, J. Goldstein, L. Seidman, R. W. McCarley, C.-F. Westin, and M. E. Shenton. Biomarkers for identifying first-episode schizophrenia patients using diffusion weighted imaging. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, volume 6361, pages 657–665, 2010.
- [2] P. Savadjiev, Y. Rathi, J. G. Malcolm, M. E. Shenton, and C.-F. Westin. A geometry-based particle filtering approach to white matter tractography. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, volume 6362, pages 233–240, 2010.
- [3] J. G. Malcolm, M. E. Shenton, and Y. Rathi. Filtered tractography: Validation on a physical phantom. In *Diffusion Modeling and Fiber Cup (in MICCAI)*, pages 220–223, 2009.
- [4] J. G. Malcolm, M. Kubicki, M. E. Shenton, and Y. Rathi. The effect of local fiber model on population studies. In *Diffusion Modeling and Fiber Cup (in MICCAI)*, pages 33–40, 2009.
- [5] J. G. Malcolm, M. E. Shenton, and Y. Rathi. Filtered tractography: State estimation in a constrained subspace. In *Diffusion Modeling and Fiber Cup (in MICCAI)*, pages 122–133, 2009.

- [6] J. G. Malcolm, M. E. Shenton, and Y. Rathi. Two-tensor tractography using a constrained filter. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, volume 12, pages 894–902, 2009.
- [7] J. G. Malcolm, M. E. Shenton, and Y. Rathi. Neural tractography using an unscented Kalman filter. In *Information Processing in Medical Imaging (IPMI)*, pages 126–138, 2009.
- [8] J. Malcolm, Y. Rathi, M. Shenton, and A. Tannenbaum. Label Space: A coupled multi-shape representation. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, volume 11, pages 416–424, 2008.
- [9] P. Karasev, J. Malcolm, and A. Tannenbaum. Kernel-based high-dimensional histogram estimation for visual tracking. In *Int. Conf. on Image Processing (ICIP)*, pages 2728–2731, 2008.
- [10] S. Lankton, J. Malcolm, A. Nakhmani, and A. Tannenbaum. Tracking through changes in scale. In *Int. Conf. on Image Processing (ICIP)*, pages 241–244, 2008.
- [11] S. Lankton, J. Melonakos, J. Malcolm, S. Dambreville, and A. Tannenbaum. Localized statistics for DW-MRI fiber bundle segmentation. In *Mathematical Methods in Biomedical Image Analysis (MMBIA)*, pages 1–8, 2008.
- [12] J. Malcolm, Y. Rathi, and A. Tannenbaum. Label Space: A multi-object shape representation. In *Combinatorial Image Analysis*, pages 185–196, 2008.
- [13] J. Malcolm, Y. Rathi, A. Yezzi, and A. Tannenbaum. Fast approximate surface evolution in arbitrary dimension. In *SPIE Medical Imaging*, 2008.
- [14] J. Malcolm, Y. Rathi, A. Yezzi, and A. Tannenbaum. Fast approximate curve evolution. In *SPIE Electronic Imaging*, 2008.
- [15] Y. Rathi, S. Dambreville, M. Niethammer, J. Malcolm, J. Levitt, M. Shenton, and A. Tannenbaum. Segmenting images analytically in shape space. In *SPIE Medical Imaging*, volume 6914, 2008.
- [16] J. Malcolm, Y. Rathi, and A. Tannenbaum. A graph cut approach to image segmentation in tensor space. In *Component Analysis Methods (in CVPR)*, pages 1–8, 2007.
- [17] J. Malcolm, Y. Rathi, and A. Tannenbaum. Multi-object tracking through clutter using graph cuts. In *Non-rigid Registration and Tracking Through Learning (in ICCV)*, 2007.
- [18] J. Malcolm, Y. Rathi, and A. Tannenbaum. Tracking through clutter using graph cuts. In *British Machine Vision Conf. (BMVC)*, 2007.
- [19] J. Malcolm, Y. Rathi, and A. Tannenbaum. Graph cut segmentation with nonlinear shape priors. In *Int. Conf. on Image Processing (ICIP)*, pages 365–368, 2007.
- [20] Y. Rathi, O. Michailovich, J. Malcolm, and A. Tannenbaum. Seeing the unseen: Segmenting with distributions. In *Conf. on Signal and Image Processing*, volume 534, 2006.
- [21] P. Vela, M. Niethammer, J. Malcolm, and A. Tannenbaum. Closed loop visual tracking using observer-based dynamic active contours. In *Conf. on Guidance, Navigation, and Control*, 2005.

Abstract and Poster

- [1] J. Malcolm, P. Yalamanchili, C. McClanahan, C. Venugopalakrishnan, K. Patel, and J. Melonakos. ArrayFire: a GPU acceleration platform. In *SPIE Modeling and Simulation for Defense Systems and Applications VII*, volume 8403, 2011.
- [2] S. Lienhard, J. Malcolm, C.-F. Westin, and Y. Rathi. A full bi-tensor neural tractography algorithm using the unscented Kalman filter. In *Int. Symp. on Magnetic Resonance in Medicine (ISMRM)*, page 3960, 2011.

- [3] G. Pryor, B. Lucey, S. Maddipatla, C. McClanahan, J. Melonakos, V. Venugopalakrishnan, K. Patel, P. Yalamanchili, and J. Malcolm. High-level GPU computing with Jacket for MATLAB and C/C++. In *SPIE Modeling and Simulation for Defense Systems and Applications VI*, volume 8060, 2011.
- [4] Y. Rathi, J. Malcolm, S. Bouix, C-F. Westin, M. Kubicki, and M. E. Shenton. Mixture model for estimating fiber ODF and multi-directional tractography. In *Int. Symp. on Magnetic Resonance in Medicine (ISMRM)*, page 3548, 2009.
- [5] H. P. Ng, M. Kubicki, J. Malcolm, Y. Rathi, P. Pelavin, R. W. McCarley, and M. E. Shenton. Diffusion two-tensor tractography study on inter-hemispheric connection between bilateral heschl’s gyrus in schizophrenia. In *Int. Symp. on Magnetic Resonance in Medicine (ISMRM)*, 2010.
- [6] H. P. Ng, M. Kubicki, Y. Rathi, J. Malcolm, P. Pelavin, R. Kikinis, and M. E. Shenton. Decreased fractional anisotropy in inter-hemispheric connection between bilateral superior temporal gyrus gray matter in chronic Schizophrenia. In *Schizophrenia Research*, volume 117, pages 342–343, April 2010.
- [7] G. Pryor, J. Melonakos, T. Rehman, and J. Malcolm. Jacket: The GPU engine for MATLAB. In *SuperComputing*, 2008.
- [8] A. Wyrzykowski, K. Tchorz, K. Inaba, J. Cushman, J. Malcolm, M. Dunham, T. Murphy, W. Ingram, G. Rozycki, and D. Feliciano. Changing trends in the management of renal trauma. In *American Association for the Surgery of Trauma*, 2006.

Patent

- [1] G. Pryor, J. Malcolm, J. Melonakos, and T. Rehman. System for improving utilization of GPU resources, June 2009. U.S. Patent Application 20090141034.

Talks and Oral Presentations

- [1] Jacket: Visual Computing, April 2011. CS264 Guest Lecture Series (Harvard, Boston, MA).
- [2] Seven tricks we learned to get top performance, Sep 2010. GPU Tech Conference (San Jose, CA).
- [3] Median filtering: A cast study in CUDA optimization, Oct 2009. GPU Tech Conference (San Jose, CA).
- [4] J. G. Malcolm, M. E. Shenton, and Y. Rathi. Neural tractography using an unscented Kalman filter. In *Information Processing in Medical Imaging (IPMI)*, pages 126–138, 2009.
- [5] J. Malcolm, Y. Rathi, M. Shenton, and A. Tannenbaum. Label Space: A coupled multi-shape representation. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, volume 11, pages 416–424, 2008.
- [6] J. Malcolm, Y. Rathi, A. Yezzi, and A. Tannenbaum. Fast approximate curve evolution. In *SPIE Electronic Imaging*, 2008.
- [7] J. Malcolm, Y. Rathi, and A. Tannenbaum. A graph cut approach to image segmentation in tensor space. In *Component Analysis Methods (in CVPR)*, pages 1–8, 2007.
- [8] P. Vela, M. Niethammer, J. Malcolm, and A. Tannenbaum. Closed loop visual tracking using observer-based dynamic active contours. In *Conf. on Guidance, Navigation, and Control*, 2005.