

# Matthew M. McCormick

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## CONTACT INFORMATION

Kitware, Inc.  
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Carrboro, NC 27510 USA

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WWW: <http://mmmccormick.com>

## EDUCATION

### University of Wisconsin-Madison

Ph.D. Biomedical Engineering, May 2011

- Dissertation Topic: "Carotid Plaque Characterization with Medical Ultrasound"
- GPA: 3.70/4.0

M.S. in Biomedical Engineering, May 2008

### Marquette University, Milwaukee, Wisconsin USA

B.S., Biomedical Engineering, May, 2005

- Minor: Mathematics, Biology
- Marquette University Honors Program
- GPA: 3.88/4.0

### St. Mary's University of Minnesota, Winona, Minnesota USA

1999-2001

### Minnesota Academy of Mathematics and Science, Winona, Minnesota USA

Graduated May, 2001

### Cotter High School, Winona, Minnesota USA

Graduated May, 2001

## WORK EXPERIENCE

### Kitware, Inc., USA

*Technical Expert*

**June 2011 - Present**

Open source, medical imaging software development.

### University of Wisconsin-Madison, USA

*Research Assistant*

**June 2005 - June 2011**

Research diagnostic medical ultrasound stiffness imaging methods for non-invasive assessment of the carotid artery.

*Teaching Assistant*

**January 2009 - May 2009**

Prepared, taught, and graded laboratories for the Diagnostic Ultrasound Physics course.

### Neuromotor Control Laboratory Marquette University, Milwaukee, WI USA

*Research Assistant*

**May 2004 - May 2005**

Electronic/mechanical hardware development for MRI compatible wrist robot, data processing and analysis for understanding of nervous system use of sensory information, adaptation, and control of the skeletal muscle system.

### Boston Scientific Corporation Maple Grove, MN USA

*Research and Design Intern*

**June 2003 - August 2003**

Research and development on peripheral vascular self-expanding Nitinol stents.

**Educational Opportunity Program** Marquette University, Milwaukee, WI USA

*Tutor*

**August 2002 - May 2005**

Tutor college students in courses such as biology, chemistry, and calculus.

**Minnesota Association for Human Genetics** University of Minnesota, Minneapolis, MN USA

*Research Intern*

**May 2000 - June 2000**

Perform genetic sequence analysis on the tyrosinase gene of individuals with albinism to probe for mutations.

PUBLICATIONS AND MANUSCRIPTS Palmeri M., Glass T., Gupta R., McCormick M., Brown A., Polascik T., Rosenzweig S., Buck A., Nightingale K., "Comparison between 3D ARFI imaging and mpMRI in detecting clinically-significant prostate cancer lesions," 2016 IEEE International Ultrasonics Symposium (IUS), Tours, 2016, pp. 1-4. doi: 10.1109/ULTSYM.2016.7728618

Zukic D., Vicory J., McCormick M., Wisse L., Gerig G., Yushkevich P., Aylward S. n-D Morphological Contour Interpolation. Insight Journal. 2016 January-December. URL: <http://hdl.handle.net/10380/3563>.

Zukic D., McCormick M., Gerig G., Yushkevich P. RLEImage: run-length encoded memory compression scheme for an itk::Image. Insight Journal. 2016 January-December. URL: <http://hdl.handle.net/10380/3562>.

McCormick M., Kang H.J., Barre S. Performance Benchmarking the Insight Toolkit. Insight Journal. 2016 January-December. URL: <http://hdl.handle.net/10380/3557>.

Liu, X., Niethammer, M., Kwitt, R., McCormick M. and Aylward S., Low-Rank to the Rescue: Atlas-based Analyses in the Presence of Pathologies, in Proceedings of the International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI '14) 17 (3):97-104. 2014. PMID: 25320787.

McCormick, M., Liu, X., Jomier, J., Marion, C. Ibanez, L. ITK: Enabling Reproducible Research and Open Science. Front. Neuroinform. 8:13. 2014. doi: 10.3389/fninf.2014.00013. PMID: 24600387. PMCID: PMC3929840.

McCormick, M. and Varghese, T. An Approach to Unbiased Subsample Interpolation for Motion Tracking. Ultrasonic Imaging. 35(2):76-89. 2013. PMCID: PMC3656167.

Ibanez, L, Liu, X, McCormick, M. ITK Bar Camp: Growing the ITK Community. Kitware's The Source. Issue 24, January 2013. URL: <http://www.kitware.com/source/home/post/92>

McCormick, M. New Infrastructure for Easy Multi-threading in ITKv4. Kitware's The Source. Issue 24, January 2013. URL: <http://www.kitware.com/source/home/post/94>

McCormick, M, Varghese, T, Wang, X, Mitchell, C, Kliewer, MA, Dempsey, RJ. Methods for robust in vivo strain estimation in the carotid artery. Physics in Medicine and Biology. 57 (2012):7329-7353. doi: 10.1088/0031-9155/57/22/7329. PMID: 23079725. PMCID: PMC3740562

McCormick, M, Madsen, E, Deaner, M; Varghese, T. Absolute backscatter coefficient estimates of tissue-mimicking phantoms in the 5-50 MHz frequency range. *Acoustical Society of America*. 130(2):737-43. 2011. PMID: 21877789. PMCID: PMC3190655.

McCormick, M, Rubert, N and Varghese, T. Bayesian Regularization Applied to Ultrasound Strain Imaging. *IEEE Transactions on Biomedical Engineering*. 58 (6):1612-1620. 2011. PCMCID: PMC3092822.

Perrot-Audet, A, McCormick, M, Gelas, A, Rannou, N, Souhait, L, Mosaliganti, K, and Megason, S. A Lightweight Image Comparison Library. *Kitware's The Source*. Issue 16, January 2011. URL: <http://www.kitware.com/products/html/ALightweightImageComparisonLibrary.html>

McCormick, M. Ultrasound and ITKv4. *Kitware's The Source*. Issue 16, January 2011. URL: <http://www.kitware.com/products/html/UltrasoundAndITKv4.html>

Madsen, E; Frank, G; McCormick, M; Deaner, M. Anechoic Sphere Phantoms for Estimating 3-D Resolution of Very High Frequency Ultrasound Scanners. *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*. 57 (10):2284-2292. 2010. doi:10.1109/TUFFC.2010.1689. PMID: 20889416. PMCID: PMC3769966

McCormick, M. Higher Order Accurate Derivative and Gradient Calculation in ITK. *Insight Journal*. 2010 July-December. URL: <http://hdl.handle.net/10380/3231>

McCormick, M. Visual Debugging of ITK. *Kitware's The Source*. Issue 13, April 2010.

McCormick, M. An Open Source, Fast Ultrasound B-Mode Implementation for Commodity Hardware. *Insight Journal*. 2010 January-June. URL: <http://hdl.handle.net/10380/3159>

Shi, H; Varghese, T; Mitchell, C; McCormick, M; Dempsey, RJ; Kliewer, MA. In-vivo Attenuation and Equivalent Scatter size parameters for Atherosclerotic Carotid Plaque: Preliminary Results. *Ultrasonics* 49 (8):779-785. 2009. PMCID:PMC2785011.

Shi, H; Mitchell, CC; McCormick, M; Kliewer, MA; Dempsey, RJ; Varghese, T. Preliminary in vivo atherosclerotic carotid plaque characterization using the accumulated axial strain and relative lateral shift strain indices. *Phys Med Biol*. 53 (22):6377-94. 2008. PMID: 18941278. PMCID:PMC2891504.

#### CONFERENCE PRESENTATIONS

Aylward, S. R., McCormick, M. M., Kang H. J., Razzaque, S., R. Kwitt, R., and M. Niethammer. Ultrasound spectroscopy. 2016 IEEE International Symposium on Biomedical Imaging: From Nano to Macro, ISBI 2016 - Proceedings. Prague, Czech Republic. 1013-1016. 2016. doi: [dx.doi.org/10.1109/ISBI.2016.7](https://doi.org/10.1109/ISBI.2016.7)

Palmeri, M., Glass, T, Gupta, R., McCormick, M. M., Brown, A., Polascik, T., Rosenzweig, S., Buck, A., and Nightingale, K. Comparison Between 3D ARFI Imaging and mpMRI in Detecting Clinically-Significant Prostate Cancer Lesions. 2016 IEEE International Ultrasonics Symposium (IUS). Tours, France. September, 2016.

McCormick, M., Enquobarhrie, A., Razzaque, S., Heaney, B., State, A., Aylward, S. Using the Physics of Ultrasound Acquisition in Vessel-to-Image Registration for Image-Guided Surgery. *Society for Imaging Informatics in Medicine*. May, 2014. Long Beach, CA.

McCormick M., Dempsey R., Varghese T., Mitchell C, Kliewer M. Noninvasive Measurement of Pulsatile Carotid Palque Deformation by Strain Tensor Ellipses: Possible Determinate of Symp-tomatology. Proceeding of the International Conference on Coronary Artery Disease. Oct, 2011.

McCormick, M and Varghese, T. Reduction of Reverberation Artifacts in Carotid Strain Images Us-ing Bayesian Regularization. International Conference on the Ultrasonic Measurement and Imaging of Tissue Elasticity. Oct 16, 2010. Snowbird, Utah.

McCormick, M and Varghese, T. Subsample Displacement Interpolation Using Windowed-Sinc Re-construction with Numerical Optimization. International Conference on the Ultrasonic Measurement and Imaging of Tissue Elasticity. Oct 16, 2010. Snowbird, Utah.

McCormick, M and Varghese, T. Open Technologies Applied to a Non-standard Medical Image Format for Innovative Research. MathBio2: IMAGE. November 2009. Madison, WI.

McCormick, M; Varghese, T; Dempsey, RJ; Zagzebski, J; Madsen, E. High Frequency Ultrasonic Characterization of Excised Atherosclerotic Carotid Plaque. Ultrasonic Imaging and Tissue Char-acterization Symposium. June 2009. Arlington, VA.

Madsen, E; McCormick, M; Frank, G. Phantoms for Assessing Intravascular (IVUS) Ultrasound Scanners. American Institutes in Ultrasound and Medicine Conference. April 2009. New York, NY.

McCormick, M; Shi, H; Mitchell C; Kliewer M; Dempsey R; Varghese T. Mechanical Viscoelastic Variations of *in vivo* Carotid Atheromas using External Ultrasound. Fifth International Conference on the Ultrasonic Measurement and Imaging of Tissue Elasticity. Oct 8, 2006. Snowbird, Utah USA.

#### PEER REVIEW DUTY

Peer review has been provided for the following journals:

Journal of the Acoustical Society of America (JASA)  
IEEE Transactions on Medical Imaging  
Insight Journal  
Medical Image Computing and Computer Assisted Intervention (MICCAI)  
Ultrasound in Medicine and Biology  
Ultrasonic Imaging

#### COMPUTER SKILLS

- Languages: C++, Python, Matlab, and Bash.
- Operating Systems: Linux, Windows.

Patches submitted to and accepted at:

- 3D Slicer. A multi-platform, free and open source software package for visualization and medical image computing.  
<http://slicer.org/>
- Awesome Window Manager  
<http://awesome.naquadah.org/>
- Bioimage Suite. Medical image processing and visualization.  
<http://www.bioimagesuite.org/>
- CalaTK. The Cross-sectional and longitudinal atlas toolkit. *Developer status*.  
<http://calatk.org/>
- cgkit. A fast web-interface for git repositories.  
<http://hjemli.net/git/cgkit/about/>
- CMake. C and C++ configuration tool.  
<http://www.cmake.org/>
- CommonTK. The goal of CTK is to support biomedical image computing.

- <http://www.commonstk.org/>
- FARSIGHT Toolkit. An organized collection of software modules for image data handling, pre-processing, segmentation, inspection and editing, post-processing, and secondary analysis of microscopy images.  
<http://www.farsight-toolkit.org/>
- gccxml. XML output for GCC.  
<http://www.gccxml.org/>
- Gentoo. Linux distribution.  
<http://www.gentoo.org/>
- InsightToolkit. Insight Segmentation and Registration Toolkit. *Developer status*.  
<http://itk.org/>
- PLUS (Public software Library for UltraSound imaging research.)  
<https://www.assembla.com/spaces/plus/wiki>
- Pyclewn. Pyclewn allows using vim as a front end to a debugger.  
<http://pyclewn.sourceforge.net/>
- QGoImageCompare. QGoImageCompare is a library aimed at simple comparison of images.  
<https://github.com/gofigure2/QGoImageCompare/>
- SimpleITK. SimpleITK is a simplified layer built on top of ITK, intended to facilitate its use in rapid prototyping, education, and with interpreted languages.  
<http://www.simpleitk.org/>
- scikits-image. scikits-image is a collection of algorithms for image processing.  
<http://scikits-image.org/>
- TubeTK. TubeTK is an open-source toolkit for the segmentation, *Developer status*. registration, and analysis of tubes and surfaces in images.  
<http://tubetk.org/>
- usimagtool. Medical ultrasound image processing tool.  
<http://www.lpi.tel.uva.es/usimag/en/ContenidoEn.php?IdContenido=6/>
- veusz. Veusz is a scientific plotting and graphing package written in Python.  
<http://home.gna.org/veusz/>
- vistrails. VisTrails is an open-source scientific workflow and provenance management system that provides support for data exploration and visualization.  
<http://vistrails.org/>
- VTK. The Visualization Toolkit is an open-source, freely available software system for 3D computer graphics, image processing and visualization.  
<http://www.vtk.org/>
- VXL. VXL (the Vision-something-Libraries) is a collection of C++ libraries designed for computer vision research and implementation.  
<http://vxl.sourceforge.net/>
- XDress. XDress is an automatic wrapper generator for C/C++ written in pure Python.  
<http://xdress.org/>

## AWARDS AND ACTIVITIES

InSCIght. The Scientific Computing Podcast.

- Moderator/Panelist.
- <http://inscight.org/>

IEEE Member.

SciPy: Scientific Computing With Python International Conference. Program Committee Co-chair, 2012 and 2013. Birds of a Feather Committee Chair, 2014. Vision, Visualization, and Imaging Symposium Chair, 2014.

UW-Madison The Hacker Within. A peer-teaching group whose purpose is to provide non-computer scientists with the practical skills required to perform research.

- Organizing member of the 2011 Software Carpentry Bootcamp.

- Arranged university-sponsored guest lecture of Dr. John D. Hunter from Chicago.
- Organizing member of the 2010 Python Bootcamp.
- Presentations on CMake and creating custom pretty-printers in GDB.
- Representation at PyCon 2010.

2009 Department of Medical Physics Outstanding Teacher Award.

- Nomination by students.

Clinical Neuroengineering Training Program, University of Wisconsin-Madison, 2008-2009.

Marquette University Honors Program.

Alpha Eta Mu Beta, National Biomedical Engineering Honor Society.

- Local Chapter Secretary, 2003 - 2004
- President, 2004 - 2005

Pi Mu Epsilon- National Mathematics Honor Society.

Marquette University Concert, Jazz, Doc C's Combo, Orchestral, and Pep Bands.

Biomedical Engineering Society, BMES.

Marquette 2002 Engineering Outstanding Sophomore.

- Graduated with High Scholastic Honors

Rehabilitation Engineering Research Centers on Accessible Medical Instrumentation.

- First Place in category, Second Place overall for project on Accessible Syringe Dosing 2004-2005
- <http://www.eng.mu.edu/wintersj/b18/>