

## David M. Mayerich

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Beckman Institute  
University of Illinois at Urbana-Champaign  
5211 Beckman  
405 N. Matthews Avenue  
Urbana, IL 61801

Phone: (217) 244-0918  
mayerich@illinois.edu  
<http://students.cs.tamu.edu/dmm8995/>

### Education

Ph.D. Computer Science, Texas A&M University, 2009  
“Imaging and Computational Methods for Exploring Sub-cellular Anatomy”  
Advisors: John Keyser, Bruce McCormick, Yoonsuck Choe, Louise Abbott, and Donald House

M.S. Computer Science, Texas A&M University, 2003  
“Acquisition and Reconstruction of Brain Tissue Using Knife-Edge Scanning Microscopy”  
Advisors: John Keyser, Andreas Klappenecker, and Ergun Alkeman

B.S. Computer Science, Southwestern Oklahoma State University, 2000 (*Cum Laude*)

### Professional Experience

Postdoctoral Fellow 2009–Present  
Beckman Institute for Advanced Science and Technology  
Design and development of visualization and segmentation tools for biomedical images. Analysis of features in high-resolution biomedical data sets.

Research Assistant 2004–2009  
Brain Networks Laboratory, Texas A&M University  
Development of microscopy and nano-machining techniques for Knife-Edge Scanning Microscopy (KESM). Development and implementation of image-processing, segmentation, and visualization algorithms for large 3D data sets. Supervisors: Yoonsuck Choe and Bruce McCormick.

Research and Software Development 2002–2004  
Swiki Anderson and Associates / Accu\*Air Bryan, TX  
Design and implementation of simulations for gas and air flow analysis in building construction. Research and design of automated and remote fume hood controls. Supervisor: Steve Summers.

### Teaching Experience

Graduate Teaching Academy Fellow (2008)

Student Research Mentor (provided guidance to undergraduate researchers)

- Kasra Manavi, University of New Mexico, Summer 2008
- Gabriel Dzodom, University of Virginia, Summer 2007

Teaching Assistant

- Computer Graphics, Texas A&M University, Spring 2005
- C++ Programming, Texas A&M University, Summer 2004
- Computer Graphics, Texas A&M University, Spring 2004
- Java Programming, Texas A&M University, Fall 2000

## **Honors and Awards**

Stony Brook Modeling Week Student Travel Grant, Stony Brook, NY (2008)

ISBI Student Travel Grant, Paris, France (2008) (*supported by NSF*)

Faculty of Neuroscience Travel Grant, Society for Neuroscience, San Diego, CA (2007)

Graduate Assistance in Areas of National Need (GANN) Fellow (2006-2007)

Teaching Excellence Award, Computer Graphics (2004) (*awarded to one teaching assistant per year*)

### Refereed Papers (Computer Science)

D. Mayerich, J. Keyser, Hardware Accelerated Segmentation of Complex Volumetric Filament Networks, *IEEE Transactions on Visualization and Computer Graphics*, 15(4): 670-681, Jul.-Aug. 2009. appeared in *Proceedings of the ACM Symposium on Solid and Physical Modeling (SPM 2008)* as “Filament Tracking and Encoding for Complex Biological Networks”, pp. 353-358.

D. Mayerich, L.C. Abbott, J. Keyser, Visualization of Cellular and Microvascular Relationships, *IEEE Transactions on Visualization and Computer Graphics*, 14(6): 1611-1618, Nov.-Dec. 2008. appeared in *Proceedings of IEEE Visualization (VIS 2008)*

D. Mayerich, J. Kwon, Y. Choe, L. Abbott, J. Keyser, Constructing High-Resolution Microvascular Models, *Proceedings of the 3rd International Workshop on Microscopic Image Analysis with Applications in Biology (MTAAB 2008)*, September, 2008.

J. Kwon, D. Mayerich, Y. Choe, B.H. McCormick, Automated Lateral Sectioning for Knife-Edge Scanning Microscopy, *Proceedings of the 5th IEEE International Symposium on Biomedical Imaging: From Nano to Macro (ISBI 2008)*, pp. 1371-1374, 2008. (*Podium presentation*)

D. Mayerich, B.H. McCormick, and J. Keyser, Noise and Artifact Removal in Knife-Edge Scanning Microscopy, *Proceedings of the 4th IEEE International Symposium on Biomedical Imaging: From Nano to Macro (ISBI 2007)*, pp. 556-559, Piscataway, NJ: IEEE Press, 2007. (*Podium presentation*)

Z. Melek, D. Mayerich, C. Yuksel, and J. Keyser, Visualization of Fibrous and Thread-like Data, *IEEE Transactions on Visualization and Computer Graphics*, 12(5): 1165-1172, October 2006. appeared in *Proceedings of IEEE Visualization (VIS 2006)*

B.H. McCormick, W. Koh, Y. Choe, L.C. Abbott, J. Keyser, D. Mayerich, Z. Melek, and P. Daddapaneni, Construction of Anatomically Correct Models of Mouse Brain Networks, *Neurocomputing*, 58-60: 379-386, 2004.

### Refereed Papers (Biology)

D. Mayerich, L.C. Abbott, B.H. McCormick, Knife-Edge Scanning Microscopy for Imaging and Reconstruction of Three-Dimensional Anatomical Structures of the Mouse Brain, *Journal of Microscopy*, 231(1): 134-143, July 2008. (*Cover Image*)

### Book Chapters

Y. Choe, L.C. Abbott, D. Han, P. Huang, J. Keyser, J. Kwon, D. Mayerich, Z. Melek, B.H. McCormick, Knife-Edge Scanning Microscopy: High-throughput Imaging and Analysis of Massive Volumes of Biological Microstructures, In R. Rao and G. Cecchi, editors, *High-throughput Image Reconstruction and Analysis: Intelligent Microscopy Applications*, Series on Bioinformatics and Biomedical Imaging, Artech House Publishers, pp. 11-34, Jan. 2009.

### Technical Reports

B.H. McCormick, M. Wiercigroch, D. Mayerich, Knife-Edge Scanning Microscope Using an Ultra-Precision 3-Axis CNC Diamond Turning Lathe, *Technical Report*, Department of Computer Science, Texas A&M University, TAMU-CS-TR-2005-5-3, May 2005.

C.B. Stephens, D. Mayerich, Brain Tissue Scanner: User Interface, *Technical Report*, Brain Networks Lab, Department of Computer Science, Texas A&M University, August 2003.

### **Selected Conference Abstracts (Computer Science)**

D. Mayerich, Z. Melek, J. Keyser, Fast Filament Tracking Using Graphics Hardware, *Proceedings of IEEE Visualization 2007*, 2007. (Poster)

B.H. McCormick, P. Doddapaneni, D. Mayerich, Z. Melek, J. Keyser, Compression, Segmentation, and Modeling of Large-Scale Filamentary Volumetric Data, *Proceedings of IEEE Visualization 2004*, 31-32, 2004. (Poster)

### **Selected Conference Abstracts (Biology)**

D. Mayerich, L.C. Abbott, Y. Choe, D. Han, J. Keyser, Z. Melek, B.H. McCormick, Efficient Methods for Tracing and Visualization of Neural Morphology in Microscopy Image Stacks, *Society for Neuroscience Annual Meeting*, 2007. (Poster)

Y. Choe, L.C. Abbott, J. Keyser, J. Kwon, D. Mayerich, Z. Melek, B.H. McCormick, Enhanced Microvascular Staining and Tracing in Large Volumes of Mouse Brain Tissue, *Society for Neuroscience Annual Meeting*, 2007. (Poster)

D. Mayerich, L.C. Abbott, B.H. McCormick, Imaging and Reconstruction of Mouse Brain Vasculature and Neighboring Cells Using Knife-Edge Scanning Microscopy, *Society for Neuroscience Annual Meeting*, 2006. (Poster)

B.H. McCormick, B.L. Busse, D. Mayerich, L.C. Abbott, Y. Choe, J. Keyser, S.J. Smith, and W. Denk, Biologically Accurate Modeling of Mouse Brain Requires Biologically Accurate Networks, *Proceedings, Microscopy and Micro-analysis Conference 2005*, Honolulu, Hawaii, July 21 - August 4, 2005. (Podium presentation)

B.H. McCormick, D. Mayerich, B.L. Busse, Z. Melek, W. Koh, L.C. Abbott, Y. Choe, J. Keyser, and E.J. Kim, The Whole Mouse Brain: The Spatial Distribution and Morphology of Its Neurons, *Proceedings, Microscopy and Micro-analysis Conference 2005*, Honolulu, Hawaii, July 21 - August 4, 2005. (Podium presentation)

B.H. McCormick, D. Mayerich, and M. Wiercigroch, Nanomachining for High-Resolution Scanning of Mammalian Brain Microstructure, *11th International Conference on Fracture*, Turin, Italy, March 20-25, 2005. (Invited presentation)

B.H. McCormick and D. Mayerich, Three Dimensional Imaging Using Knife-Edge Scanning Microscopy, *Proceedings, Microscopy and Micro-analysis Conference 2004*, Savannah, GA, August 1-5, 2004. (Podium presentation)

### **Invited Presentations**

D. Mayerich, Imaging, Modeling, and Visualization of Tissue Microstructure, *The 19th Conference on Visualization (VIS 2008)*, Ph.D. Colloquium, October 2008.

D. Mayerich, Acquisition and Reconstruction in Large Scale Volume Microscopy, *National Science Foundation Symposium on Cyber-Enabled Development and Innovation*, Ph.D. Colloquium, 2007. (Nominated by TAMU and Invited by NSF)

### **Other Talks**

“A Short Course on Interactive Graphics”, Computer Science Department Seminar, Southwestern Oklahoma State University, January 2008.

“Advances in the Acquisition and Reconstruction of Microscopy Data Sets”, Molecular and Biological Networks Seminar, Texas A&M University, September 2005.

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### Scientific Software (*students.cs.tamu.edu/dmm8995*)

D. Mayerich, Z. Melek, J. Keyser (2007): **GPU Tracer**, A GPU-based program for tracking filaments in volumetric data sets. Originally designed to extract network information for neurons and vasculature in high-throughput optical microscopy.

D. Mayerich, M. Davis (2007): **RealTime Scapes Library**, A C++ library containing several useful classes for 3D segmentation, reconstruction, and visualization.

D. Mayerich, J. Keyser, B.H. McCormick (2007): **KESM Stack Processor**, An application that automates the removal of lighting artifacts from KESM images. Images are also converted to 3D RAW data and stored for optimized loading of random sub-volumes.

### Service and Activities

International Joint Conference on Neural Networks (IJCNN), Technical Committee, 2008

Co-Organizer, Games 2007 Computer Game Design Competition, Texas A&M University, Fall 2007.

Co-Organizer, Seminar Series on Molecular and Biological Networks, Texas A&M University, Fall 2005

### Professional Memberships

Student Member, Institute of Electrical and Electronics Engineers (IEEE)

Student Member, Society for Neuroscience (SfN)

Student Member, Association of Computing Machinery (ACM), SIGGRAPH