

Daniel Mirola

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SUMMARY OF QUALIFICATIONS:

- Ph.D. candidate with five years of experience in both computer vision and medical image analysis research and two years of experience in the medical software industry developing applications in Matlab, C++, and Python
- Passionate for advancing health care technology through a position designing and implementing state-of-the-art computer vision, registration and visualization algorithms for surgical navigation
- Interest in video reconstruction, medical image registration and visualization

RESEARCH EXPERIENCE:

Johns Hopkins University, Baltimore, Maryland 9/2007-present
Graduate Research Assistant

Advisors: Drs. Gregory D. Hager and Jeffrey H. Siewerdsen

- Prototyped a registration algorithm in Matlab to register reconstructed video to CT data
- Developed an image mosaicking algorithm in C++ for registering microscope images of the retina
- Integrated multiple existing prototypes developed in C++, Matlab, and Python into a single Python-based platform to maximize code reuse
- Created phantom models for accuracy evaluation of computer vision algorithms
- Designed and carried out studies to evaluate navigation performance
- Built a VTK/3D Slicer-based visualization for endoscope video augmented reality

Technical University of Munich, Munich, Germany 6/2007-8/2007
Visiting Graduate Research Assistant

Advisor: Dr. Darius Burschka

- Built a software framework for endoscopic video reconstruction in Matlab
- Evaluated motion estimation and 3D reconstruction accuracy

PROFESSIONAL EXPERIENCE:

Siemens Corporate Research, Princeton, New Jersey 6/2006-8/2006
Prototype Developer Internship

- Integrated automatic detection of key cardiac cycle time points into clinical software
- Collaborated with clinical cardiac researchers on-site at the National Institutes of Health
- Translated Matlab prototype to optimized C++ libraries

Cooperative Education Prototype Developer 2/2005-8/2005

- Created C++ curve fitting library for use with existing medical software and new prototypes
- Produced custom software solution in C++ for heart analysis
- Translated IDL programming to optimized C++ libraries for signal processing

Cooperative Education Prototype Developer 5/2004-9/2004

- Demonstrated cardiac analysis prototypes to a group of potential customers
- Developed prototypes in C++ with MFC to add new features to cardiac analysis suite
- Collaborated with developers to meet project deadlines and specifications

- Cooperative Education Prototype Developer 9/2003-12/2003
- Prototyped new program functionality in C++ for existing cardiac analysis software as a proof of concept of the latest image segmentation interface
 - Investigated critical software problem accessing a database and implemented solution in C++
 - Created prototype documentation for software use, maintenance, and updating

- Siemens Medical Solutions**, Princeton, New Jersey
 Cooperative Education Software Testing Engineer 1/2003-5/2003
- Edited and updated software test books to keep test cases synchronized with software
 - Created Windows batch scripts to help automate software testing on Windows XP
 - Tested manual software test books to verify proper software functionality on Windows XP

LEADERSHIP EXPERIENCE:

- Chorus of the Chesapeake**, Dundalk, Maryland
 Vice President of Music and Performance 1/2011-11/2011
- Planned rehearsal schedule to support coaching sessions
 - Managed music committee to provide an engaging learning experience for the membership

- Member at Large 1/2009-12/2010
- Served as a representative of the membership body to the board of directors
 - Coordinated online social network outreach

- Johns Hopkins University**, Baltimore, Maryland
 Instructor, Interactive Photo and Video Application for Online Social Networks: 1/2009
- Designed a curriculum integrating Computer Vision and Web 2.0 application design
 - Won \$500 grant from the Johns Hopkins Digital Media Center for web cameras to use in class

- Facilitator, Robotic Systems Challenge 4/2008
- Organized registration and event logistics
 - Evaluated high school student robot designs, giving constructive feedback
 - Constructed courses for the robots to navigate

- Computer Science Department Graduate Student Association Board Member: 9/2007-8/2008
- Managed department budgets for graduate student purchases
 - Improved graduate student life by contributing to the graduate lounge

- Stevens Institute of Technology**, Hoboken, New Jersey
 Project Liaison, Senior Design Project 9/2005-5/2006
- Designed, proposed and presented a collaboration project to both Siemens management and Stevens students
 - Facilitated communication between the Stevens student team and Siemens management

EDUCATION:

Johns Hopkins University, Baltimore, Maryland 9/2006-present
 Ph.D. in Computer Science, Expected July 2012
 Advisors: Drs. Gregory D. Hager and Jeffrey H. Siewerdsen

Johns Hopkins University, Baltimore, Maryland 9/2006-5/2009
 Masters of Science in Engineering in Computer Science
 Advisor: Dr. Gregory D. Hager GPA: 3.61

Stevens Institute of Technology, Hoboken, New Jersey 8/2001-5/2006

Bachelor of Science in Computer Science, Minors in Math and Music
Graduate Certificate in Computer Graphics
Study Abroad: University of Limerick, Limerick, Ireland

GPA: 3.71
GPA: 3.40

HONORS:

Howard and Jacqueline Chertkof Endowed Fellowship for Engineering Graduate Students, 2010
Link Foundation Fellowship in Advanced Simulation and Training, 2010-2011
Medtronic Computer Assisted Surgery Research Award, 2009
American Society for Engineering Education Cooperative Education Student of the Year, 2005
Upsilon Pi Epsilon (The Computer Science Honors Society), 2005
National Scholars Honor Society, 2004
National Dean's List, 2003
Eagle Scout (Boy Scouts of America), 1999

SKILLS:

Operating Systems: Mac OS X, Linux Ubuntu 10.04, and Windows XP/Vista
Software: Matlab 7.9, Cmake, MS Office, VTK, Eclipse, Visual Studio 2008, OpenGL, GNU Tools
Programming Languages: Python, C++, Matlab, UNIX shell scripts, Java, XHTML, CSS, Perl, JavaScript, MS Batch files, Scheme, IDL
Languages: English (native), German (conversational)

PUBLICATIONS:

Journal:

1. **D. J. Mirotta**, H. Wang, R. H. Taylor, M. Ishii, G. L. Gallia, and G. D. Hager, "A System for Video-based Navigation for Endoscopic Endonasal Skull Base Surgery," *Medical Imaging, IEEE Transactions on*, vol. 31, iss. 4, pp. 963-976, 2012.
2. A. Uneri, S. Schafer, **D. J. Mirotta**, S. Nithiananthan, Y. Otake, R. H. Taylor, and J. H. Siewerdsen, "TREK: an integrated system architecture for intraoperative cone-beam CT-guided surgery," *International Journal of Computer Assisted Radiology and Surgery*, vol. 7, pp. 159-173, 2012.
3. S. Nithiananthan, S. Schafer, A. Uneri, **D. J. Mirotta**, W. J. Stayman, W. Zbijewski, K. K. Brock, M. J. Daly, H. Chan, J. C. Irish, and J. H. Siewerdsen, "Demons deformable registration of CT and cone-beam CT using an iterative intensity matching approach," *Medical Physics*, vol. 38, iss. 4, pp. 1785-1798, 2011.
4. S. Reaungamornrat, Y. Otake, A. Uneri, S. Schafer, W. Stayman, W. Zbijewski, **D. Mirotta**, J. Yoo, S. Nithiananthan, A. J. Khanna, R. Taylor, and J. Siewerdsen, "Tracker-on-C: A novel tracker configuration for image-guided therapy using a mobile C-arm," *International Journal of Computer Assisted Radiology and Surgery*, vol. 6, pp. 134-137, 2011.
5. **D. J. Mirotta**, M. Ishii, and G. D. Hager, "Vision-Based Navigation in Image-Guided Interventions," *Annual Review of Biomedical Engineering*, vol. 13, iss. 1, pp. 297-319, 2011.
6. S. Schafer, S. Nithiananthan, **D. J. Mirotta**, A. Uneri, J. W. Stayman, W. Zbijewski, C. Schmidgunst, G. Kleinszig, A. J. Khanna, and J. H. Siewerdsen, "Mobile C-arm cone-beam CT for guidance of spine surgery: Image quality, radiation dose, and integration with interventional guidance," *Medical Physics*, vol. 38, iss. 8, pp. 4563-4574, 2011.
7. H. Wang, **D. Mirotta**, and G. D. Hager, "A Generalized Kernel Consensus Based Robust Estimator," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 32, iss. 1, pp. 178-184, 2010.
8. H. Wang, **D. Mirotta**, G. Hager, and M. Ishii, "Anatomical reconstruction from endoscopic images: Toward quantitative endoscopy," *American Journal of Rhinology*, vol. 22, iss. 1, pp. 47-51, 2008.

Conferences:

9. S. Schafer, Y. Otake, A. Uneri, **D. J. Mirotta**, S. Nithiananthan, J. W. Stayman, W. Zbijewski, G.

- Kleinszig, R. Graumann, M. Sussman, and J. H. Siewerdsen, "High-performance C-arm cone-beam CT guidance of thoracic surgery," in *SPIE Medical Imaging 2012: Image-Guided Procedures, Robotic Interventions, and Modeling*, 2012, pp. 83161i-1-83161i-13.
10. S. Reaungamornrat, Y. Otake, A. Uneri, S. Schafer, **D. J. Mirotta**, S. Nithiananthan, J. W. Stayman, A. J. Khanna, D. D. Reh, G. L. Gallia, R. H. Taylor, and J. H. Siewerdsen, "Tracker-on-C for cone-beam CT-guided surgery: evaluation of geometric accuracy and clinical applications," in *SPIE Medical Imaging 2012: Image-Guided Procedures, Robotic Interventions, and Modeling*, 2012, pp. 831609-1-831609-11.
 11. W. P. Liu, **D. J. Mirotta**, A. Uneri, Y. Otake, G. Hager, D. D. Reh, M. Ishii, G. L. Gallia, and J. H. Siewerdsen, "A clinical pilot study of a modular video-CT augmentation system for image-guided skull base surgery," in *SPIE Medical Imaging 2012: Image-Guided Procedures, Robotic Interventions, and Modeling*, 2012, pp. 831633-1-831633-9.
 12. A. Uneri, S. Schafer, **D. Mirotta**, S. Nithiananthan, Y. Otake, S. Reaungamornrat, J. Yoo, W. J. Stayman, D. Reh, G. L. Gallia, J. A. Khanna, G. Hager, R. H. Taylor, G. Kleinszig, and J. H. Siewerdsen, "Architecture of a high-performance surgical guidance system based on C-arm cone-beam CT: software platform for technical integration and clinical translation," in *Medical Imaging 2011: Visualization, Image-Guided Procedures, and Modeling*, 2011, pp. 796422-1-796422-7.
 13. **D. J. Mirotta**, A. Uneri, S. Schafer, S. Nithiananthan, D. D. Reh, G. L. Gallia, R. H. Taylor, G. D. Hager, and J. H. Siewerdsen, "High-accuracy 3D image-based registration of endoscopic video to C-arm cone-beam CT for image-guided skull base surgery," in *Medical Imaging 2011: Visualization, Image-Guided Procedures, and Modeling*, 2011, pp. 79640j-1-79640j-10.
 14. R. Sznitman, S. Billings, D. Rother, **D. Mirotta**, Y. Yang, J. Handa, P. Gehlbach, J. Kang, G. Hager, and R. Taylor, "Active Multispectral Illumination and Image Fusion for Retinal Microsurgery," , Navab, N. and Jannin, P., Eds., Springer Berlin / Heidelberg, 2010, vol. 6135, pp. 12-22.
 15. **D. Mirotta**, H. Wang, R. H. Taylor, M. Ishii, and G. D. Hager, "Toward Video-Based Navigation for Endoscopic Endonasal Skull Base Surgery," in *Medical Image Computing and Computer-Assisted Intervention — MICCAI 2009*, 2009, pp. 91-99.
 16. **D. Mirotta**, R. H. Taylor, M. Ishii, and G. D. Hager, "Direct Endoscopic Video Registration for Sinus Surgery," in *Medical Imaging 2009: Visualization, Image-guided Procedures and Modeling. Proceedings of the SPIE*, 2009, pp. 72612k-1-72612k-8.
 17. D. Abretsk, **D. Mirotta**, G. D. Hager, and M. Ishii, "Intelligent frame selection for anatomic reconstruction from endoscopic video," in *Applications of Computer Vision (WACV), 2009 Workshop on*, 2009, pp. 1-5.
 18. H. Wang, **D. Mirotta**, M. Ishii, and G. D. Hager, "Robust motion estimation and structure recovery from endoscopic image sequences with an Adaptive Scale Kernel Consensus estimator," in *Computer Vision and Pattern Recognition, 2008. CVPR 2008. IEEE Conference on*, 2008, pp. 1-7.

Abstracts:

19. L. Hsu, **D. Mirotta**, C. H. Lorenz, G. Funka-Lea, and A. E. Arai, "Automated Determination of First-Pass Contrast Enhancement Timing Facilitates Semiquantitative And Quantitative Myocardial Perfusion Measurements," in *Moderated Posters Session II*, 2007, pp. 327-333.
20. L. Hsu, F. E. Mordini, **D. Mirotta**, G. Funka-Lea, and A. E. Arai, "Myocardial Blood Flow Can Be Quantified in Sub-Gram Regions of Interest in Clinical MR First Pass Perfusion," in *International Society of Magnetic Resonance in Medicine*, 2006.

PROFESSIONAL ACTIVITIES:

Memberships: Student Member of IEEE (2007-present), IEEE Computer Society (2007-present), MICCAI Society (2008-present), SPIE (2009-present)

Reviewer: IPCAI 2012, MICCAI 2011, Journal of Image and Vision Computing 2010