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EDUCATION

Ph.D. in Computer Science, Expected Summer 2007

Johns Hopkins University, Baltimore, MD

Dissertation Title: Robust Image-Based Tracking and Prediction for Motion Compensation in Cardiovascular MR Imaging

Advisors: Dr. Gregory D. Hager and Dr. Christine H. Lorenz

M.S.E in Biomedical Engineering, August 2002

Johns Hopkins University, Baltimore, MD

Thesis Title: Design, Construction and Testing of an fMRI Compatible Robotic Arm

Advisor: Dr. Reza Shadmehr

Bachelor of Technology (Honors) in Mechanical Engineering, May 2000

Indian Institute of Technology, Kharagpur, India

Thesis Title: Control of Sloshing Through Active and Passive Strategies

Advisor: Dr. Amalendu Mukherjee

POSITIONS HELD

Research Assistant, Johns Hopkins University, Sep 2004 – Present

Robust Image-based Motion Tracking and Prediction for High Resolution Coronary MR Angiography

Proposed an online subject-specific approach that provides better motion compensation for reliable high resolution coronary MR angiography. Presently, investigating ways to validate the tracking and prediction algorithms and their implementation on the MR scanner for use in high resolution coronary MR angiography. This work is in collaboration with Siemens Corporate Research, Baltimore and Princeton.

Optimal Multiple Kernel-based SSD Tracking

Demonstrated a connection between kernel-based algorithms and traditional SSD based template tracking methods that led to a more efficient optimization (convergence in fewer steps) and use of multiple kernels for complex motion models. Also, developed a framework for optimizing the kernel parameters to the specific target region being tracked. Presently, extending the approach to optimize kernels on multiple image projections.

Imaging of Cardiac Valves in MRI

Developed a semi-automatic tracking algorithm for estimating the orientation and location of the cardiac valves in high resolution MR images. Presently, working on integrating the tracking information into the MR scanner for imaging the cardiac valves. This work is in collaboration with Siemens Medical Solutions, Erlangen.

Summer Intern, Siemens Corporate Research, Princeton, June 2004 – Aug 2004

Tracking of Coronary Arteries in Low-resolution Real-time MR images

Worked on developing online tracking and prediction algorithms for estimating coronary artery motion in low resolution real-time images. The estimated motion can be used to guide the high resolution imaging of the coronary arteries.

Research Assistant, Johns Hopkins University, Spring 2003 – May 2004

Development and Validation of Algorithms for Tracking of Surgical Tools in 3D

Developed an algorithm for tracking surgical tools in 3D and validated the tracking with the Optotrak system. The tool tracking was incorporated in a vision-based cooperative manipulation framework using 3D virtual fixtures for retinal microsurgery application.

Research Assistant, Johns Hopkins University, Fall 2000 – August 2002

Design, Construction and Testing of an fMRI Compatible Robotic Arm

Designed and constructed an fMRI compatible 2-DOF planar robotic arm. Also developed software in C++ to interface with the sensors and actuators through PCI boards and implemented algorithms for controlling the robot. Performed preliminary analysis of the fMRI data for noise artifacts.

Summer Intern, Hindustan Machine Tools, May 1999 – June 1999

Barrel Cam Mechanism Design

Proposed and implemented the barrel cam mechanism for tool changing in the automatic tool changer of the CNC machine. Hindustan Machine Tools, India was one of the pioneers in the CNC technology.

TEACHING EXPERIENCE

Course Instructor – Exploring Vision in the Real World, Intersession 2006 and 2007

Co-designed and taught the three week intersession course. The course included short homework and programming assignments, discussions and a small project.

Guest Lecturer – Computer Vision, Image Features, Dr. Gregory Hager, Fall 2006

Research Experience for Undergraduates Mentorship – David Mayhew, Summer 2006

Project: Validation of Algorithms for Tracking Coronary Arteries and Cardiac Valves in MR Images

Guest Lecturer - Computer Vision, Epipolar Geometry, Dr. Gregory Hager, Fall 2005

Teaching Assistant – Computer Integrated Surgery, Dr. Russell Taylor, Fall 2002
Responsibilities included giving supplementary lectures, holding office hours, and grading homework and programming assignments.

PUBLICATIONS

Journal Articles

- M Dewan, GD Hager, CH Lorenz, “Image-Based Coronary Tracking and Beat-to-Beat Motion Compensation for Robust Coronary MR Angiography”. Submitted to *Magnetic Resonance in Medicine (MRM)*.
- D. Burschka, J. Corso, M. Dewan, W. Lau, M. Li, H. Lin, P. Marayong, N. Ramey, G. Hager, B. Hoffman, D. Larkin, C. Hasser. “Navigating Inner Space: 3-D Assistance for Minimally Invasive Surgery”. *Robotics and Autonomous Systems*, 2005.

Conference Publications

- V Kallem, M Dewan, J Swensen, GD Hager, N Cowan “Kernel-based Visual Servoing”, Submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2007.
- M Dewan, CH Lorenz, GD Hager, “Deformable Motion Tracking of Cardiac Structures (DEMOTRACS) for Improved MR Imaging”, Accepted for presentation at *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2007.
- M Dewan, D Mayhew, A Greiser, GD Hager, CH Lorenz, “Image-based Tracking of Heart Valves for Improved Motion Compensation”. Accepted for Oral Presentation at the *International Society for Magnetic Resonance Medicine (ISMRM)*, 2007.
- M Dewan, M Caylus, L Pan, GD Hager, CH Lorenz, “Image-Based Coronary Tracking and Beat-to-Beat Motion Compensation for Robust Coronary MR Angiography”. Accepted for E-Poster Presentation at the *International Society for Magnetic Resonance Medicine (ISMRM)*, 2007.
- M Dewan, GD Hager, CH Lorenz, “Robust Image-based Motion Tracking for Coronary MR Angiography”. In Proceedings of the *International Workshop on Computer Vision for Intravascular and IntraCardiac Imaging, in conjunction with MICCAI*, 2006. Oral Presentation.
- M Dewan, GD Hager, “Toward Optimal Kernel-based Tracking”. In Proceedings of *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2006.
- M Dewan, GD Hager, SM Shea, CH Lorenz, “Compensating for Beat-to-Beat Variation in Coronary Motion Improves Image Quality in Coronary MR”. In Proceedings of the *International Society for Magnetic Resonance Medicine (ISMRM), 14th Scientific Meeting and Exhibition*, 2006.

- M Dewan, GD Hager, CH Lorenz, “Image-Based Tracking and Prediction of Coronary Motion for Coronary MR Angiography”. In Proceedings of the *9th Annual Meeting of the Society for Cardiovascular Magnetic Resonance*, 2006.
- H Lin, M Dewan, P Marayong, J Handa, GD Hager. “Vision-Based Human-Machine Collaborative System for Ophthalmic Micro-Surgery”. *Medicine Meets Virtual Reality*, 2006
- M Dewan, P Marayong, AM Okamura, GD Hager, “Vision-based Assistance for Ophthalmic Micro-Surgery”. In Proceedings of *Seventh International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 2004. Oral Presentation.
- JJ Corso, M Dewan, GD Hager, “Image Segmentation through Energy Minimization based Subspace Fusion”. In Proceedings of *17th International Conference on Pattern Recognition (ICPR)*, 2004. Oral Presentation.
- GD Hager, M Dewan, CV Stewart, “Multiple Kernel Tracking with SSD”. In Proceedings of *IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR)*, 2004.

Manuscripts in Preparation

- M Dewan, J Corso, GD Hager, “An Energy Minimization Approach for Image Segmentation by Combining Multiple Feature Spaces”. In preparation for submission to *Image and Vision Computing*.
- M. Dewan, GD Hager, “Optimal Multiple Kernel-based SSD Tracking”. In preparation for submission to *IEEE Transactions on Pattern Analysis and Machine Intelligence*.

Technical Reports and Qualifying Projects

- M Dewan, V Kallem, N Cowan, “Vision-based Control of a Planar Unicycle”. Qualifying Project, Johns Hopkins University 2005.
- J. Corso, M. Dewan, and G. Hager, “Image Segmentation Through Energy Minimization Based Subspace Fusion”. Technical Report, The Johns Hopkins University, 2004. (Extended version of ICPR 2004 paper.)

PATENTS

- Method and System for Motion Compensation in Magnetic Resonance (MR) Imaging (application filed in US and China), Inventors: Maneesh Dewan and Christine H. Lorenz

GRANT WRITING EXPERIENCE

- "Adaptive Motion Compensation for Coronary MR Imaging", R21 submission to NIH, November 2006. PI: Gregory D. Hager

PRESENTATION AND TALKS

- Robust Image-based Motion Tracking and Prediction for Coronary MR Imaging
 - Integrated Data Systems Group, Siemens Corporate Research, Princeton, NJ, Jan 2007.
 - Pattern Recognition Group, Computer Science Department, Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany, Oct 2006
 - MED MREA-CV Team, Siemens Medical Solutions, Erlangen, Germany, Oct 2006
 - JHU ERC Center for Computer-Integrated Surgery Seminar Series, Baltimore, MD, May 2006
- Robust Image-based Motion Tracking for Coronary MR Angiography, MICCAI-CVII, Copenhagen, Denmark, Oct 2006
- Vision-based Assistance for Ophthalmic Micro-Surgery, MICCAI, Saint-Malo, France, Oct 2004

ACADEMIC HONORS

- Siemens Corporate Research Graduate Student Fellowship (Fall 2004 – present)
- Johns Hopkins University Fellowship (Fall 2000 – Fall 2002)
- Ranked among the top 0.8% in the Indian Institute of technology Joint Entrance Examination (IIT-JEE) conducted on a national level and taken by approximately 120,000 students

PROFESSIONAL ACTIVITIES

Memberships

- IEEE Computer Society
- International Society of Magnetic Resonance in Medicine (ISMRM)
- Society of Cardiovascular Magnetic Resonance (SCMR)
- Medical Image Computing and Computer-Assisted Intervention (MICCAI)

Technical Reviews

- IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

- IEEE International Conference on Computer Vision (ICCV)
- Medical Image Computing and Computer-Assisted Intervention (MICCAI)
- Computer Vision and Image Understanding (CVIU)

PERSONAL DATA

- Citizenship: India
- Languages: English and Hindi
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REFERENCES

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