

Hassan Rivaz

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EDUCATION

Johns Hopkins University, Baltimore, USA

Ph.D. in Computer Science

Expected Jun 2010

Topics: Motion estimation in ultrasound images for elastography and thermal imaging applications, Tissue characterization, Freehand 3D ultrasound, Image guided intervention, Computer integrated surgery
Advisors: Prof. Gregory Hager and Prof. Gabor Fichtinger

Johns Hopkins University, Baltimore, USA

M.S. in Computer Science

Dec 2007

Advisors: Prof. Gregory Hager and Prof. Gabor Fichtinger

University of British Columbia, Vancouver, Canada

M.S. in Mechanical Engineering

Sept 2005

Thesis: Development of a hand-held device for ultrasound elastography
Advisor: Prof. Robert Rohling

Sharif University of Technology, Tehran, Iran

B.S. in Mechanical Engineering

May 2003

Thesis: Computational fluid dynamics in porous media
Academic advisor: Prof. Ali Amirfazli. Thesis Advisor: Prof. Mehrdad Manzari

AWARDS

- Breast Cancer Pre-Doctoral Traineeship Award (PI). Proposal: Breast irradiation planning based on multi-modality fusion of CT, 3D ultrasound, and tracked ultrasound elastography. \$97,000 **2008-2011**
- Link Foundation Fellowship. Proposal: Simulation and training system for ablation surgery using ultrasound elastography. \$25,000 **2008-2010**
- Medical Image Computing and Computer Assisted Intervention (MICCAI) Travel Grant. \$700 **2009**
- Best Presentation Award at Johns Hopkins Division of Medical Imaging Physics (DMIP) Annual Retreat **2008**
- University of British Columbia (UBC) International Students Scholarship \$3,500 **2003-2005**

- UBC Graduate Entrance Award \$3,000 **2003**
- University of Toronto Connaught Scholarship (declined) \$25,000 **2003**
- 3/120 in the dept. of Mech. Eng. at Sharif Univ. of Tech. **2003**
- Bronze Medal, 7th Iranian National Universities Olympiad **2002**
- 2/15,000, Iranian National University Entrance Exam for Graduate Studies. Permanently exempted from Iranian military service for this achievement **2002**
- 5/150,000, Iranian National University Entrance Exam. Awarded by the president of Iran **1999**
- Silver Medal, 12th Iranian National Physics Olympiad **1998**

TEACHING EXPERIENCE

Johns Hopkins University

Instructor

Jan 2009 & Jan 2010

Designed a new course titled "Introduction to Medical Imaging" 600.146, at the undergraduate level (with Ioana Fleming)

Johns Hopkins University

Guest Lecturer

Nov 2009

Computer Vision 600.361

Johns Hopkins University

Students Advised

Dec 2009

Nishikant Deshmukh, CS Master's student
Parallel Programming in Ultrasound Elasticity Imaging

Shahin Sefati, Mech. PhD student, computer vision final project
Ultrasound Elasticity Imaging using Phase of the RF-data

Jan-Jun 2009

Joy Salib and Peter Kamel, High school students
Research Experience in Ultrasound Imaging at JHU

Jun-Aug 2007

SELECTED PROFESSIONAL EXPERIENCE

Center for Intelligence Machines (CIM), McGill University

Visiting Student

Jun–Sept 2009

Motion estimation for ultrasound elastography. Host: Prof. Tal Arbel

Siemens Medical Solutions, Malvern, PA

Internship

Jun-Sept 2008

Developed a novel electronic colon cleansing method for CT colonography (virtual colonoscopy). Advisors: Dr. Yoshihisa Shinagawa and Dr. Jianming Liang

NSF ERC for Computer Integrated Surgery, Johns Hopkins University

Graduate Research Assistant

Jan 2006-Date

- Developed an analytical method for ultrasound elastography and utilized it in
 - Patient trials of guided breast radiation therapy using tracked ultrasound
 - Patient trials of liver ablation monitoring/guidance
 - Laparoscopic prostatectomy
- Developed a novel real time 2D ultrasound elastography technique based on dynamic programming
- Developed a statistical model for discriminating different types of tissue in ultrasound images
- Integration of a 5 DOF robot with ultrasound to acquire 3D volumes using 2D ultrasound images

Robotics, Control and Medical Imaging Laboratory, University of British Columbia

Graduate Research Assistant

2003-2006

- Developed an active vibration cancellation device for a hand-held elastography probe
- Developed system identification for estimating viscosity and elasticity of tissue using ultrasound

INVITED PRESENTATIONS

1. Rivaz, H., "Ultrasonic Guidance and Visualization In Medical Operations", Dept. of Elec. Comp. Eng., McGill University, Sept. 8, 2009
2. Rivaz, H., "Computer Assisted Intervention", Dept. of Mech. Eng., Sharif University of Technology, July 2, 2008

PATENTS

1. **Rivaz, H.**, Boctor, E., Hager, G. and Fichtinger, G., "High Resolution Freehand 3D ultrasound," US patent 26148.073.00, provisional patent filed in Mar. 2007, Utility US Patent Application filed in Jan. 2008
2. Boctor, E., Fichtinger, G., Hager, G. and **Rivaz, H.**, Apparatus and Method for Computing 3D Ultrasound Elasticity Images, US patent 26148.071.00us, provisional patent filed in Jun. 2006 Utility US Patent Application filed in Oct. 2007

PUBLICATIONS

Journal Articles

1. **Rivaz, H.**, Stolka, P., Hager G., Boctor, E. "Robust sensorless freehand 3D ultrasound", IEEE Trans. Medical Imaging (in preparation)
2. **Rivaz, H.**, Shinagawa, Y., Liang, J. "Physical Priors in Electronic Colon Cleansing for Virtual Colonoscopy", Med. Phys. (submitted)

3. **Rivaz, H.**, Boctor, E., Choti, M., Hager, G., "Regularized Ultrasound Elastography", IEEE Trans. Medical Imaging (in press, 2010)
4. **Rivaz, H.**, Boctor, E., Foroughi, P., Zellars, R., Fichtinger, G., Hager, G., "Ultrasound Elastography: a Dynamic Programming Approach", IEEE Trans. Medical Imaging Oct. 2008, vol. 27 pp 1373-1377
5. **Rivaz, H.**, Rohling, R., "An Active Dynamic vibration Absorber for a Hand-Held Vibro-Elastography Probe," ASME Trans. Vibration & Acoustics, Feb. 2007, vol. 129, pp 101-112 [Top 10 most downloaded articles from this journal in March 2008]

Conference Proceedings

6. **Rivaz, H.**, Kang, H., Stolka, P., Boctor, E. "Novel reconstruction and feature exploitation techniques for sensorless freehand 3D ultrasound", SPIE Med. Imag., 2010 (accepted)
7. **Rivaz, H.**, van Vledder, M., Choti M., Hager, G., Boctor, E. "Liver ablation guidance: discriminating ablation tumor from the cancer tumor with ultrasound elastography", SPIE Med. Imag., 2010 (accepted)
8. **Rivaz, H.**, Foroughi, P., Fleming, I., Zellars, R., Boctor, E., Hager, G., "Tracked Regularized Ultrasound Elastography for Targeting Breast Radiotherapy", Medical Image Computing and Computer Assisted Intervention, MICCAI, London, UK, Sept. 2009, pp 507-515. [Acceptance rate: 34%] [Awarded MICCAI Travel Grant]
9. **Rivaz, H.**, Liang, J., Shinagawa Y., "Electronic Colon Cleansing of the Unprepared Colon", SPIE Med. Imag., Orlando, FL, 2009, Vol. 726019, pp 1901-1912
10. Fleming, I., **Rivaz, H.**, Hamper, U., Hager, G., Boctor, E., "Ultrasound elastography: Enabling technology for image guided laparoscopic prostatectomy", SPIE Medical Imaging, Orlando, FL, Feb. 2009, Vol. 72612I
11. Foroughi, P., Csoma, C., **Rivaz, H.**, Fichtinger, G., Zellars, R., Hager, G., Boctor, E., "Multi-modality fusion of CT, 3D ultrasound, and tracked strain images for breast irradiation planning", SPIE Medical Imaging, Orlando, FL, Feb. 2009, Vol. 72651B [Best Poster Award, Second Best Paper Award]
12. Boctor, E., Matinfar, M., Ahmad, O, **Rivaz, H.**, Choti, M. Taylor, R. "Elasticity-based three dimensional ultrasound real-time volume rendering", SPIE Medical Imaging, Orlando, FL, Feb. 2009, Vol. 72612V
13. **Rivaz, H.**, Fleming, I., Matinfar, M., Khamene, A., Choti, M., Hager, G., Boctor, E., "Ablation Monitoring with a Regularized 3D Elastography Technique", IEEE Int. Ultrasonics Symposium, Beijing, China, Oct. 2008 pp 308 – 312
14. **Rivaz, H.**, Fleming, I., Assumpcao, L., Fichtinger, G., Hamper, U., Choti, M., Hager, G., Boctor, E., "Ablation Monitoring with Elastography: 2D In-vivo and 3D Ex-vivo Studies", Medical Image Computing and Computer Assisted Intervention, MICCAI, New York, NY, Sept. 2008, pp 458-466 [Acceptance rate: 34%]
15. **Rivaz, H.**, Zellars, R., Hager, G. Fichtinger, G., Boctor, E., "Beam Steering Approach to Speckle Characterization and Out-of-Plane Motion Estimation in Real Tissue", IEEE Int. Ultrasonics Symposium, New York, NY, Oct. 2007 pp 781-784

16. **Rivaz, H.**, Boctor, E., Fichtinger, G., "A Robust Meshing and Calibration Approach for Sensorless Freehand 3D Ultrasound", SPIE Medical Imaging, San Diego, CA, Feb. 2007, Vol. 6513, pp 181-188
17. **Rivaz, H.**, Boctor, E., Fichtinger, G., "Ultrasound Speckle Detection using Low Order Statistics," IEEE Int. Ultras. Symp., Vancouver, Canada, 2006, pp 2092 – 2095
18. **Rivaz, H.**, Rohling, R., "A Hand-Held Device for Vibro-Elastography," Medical Image Computing and Computer Assisted Intervention, MICCAI, Palm Springs, CA, Oct. 2005, pp 613-620 [Acceptance rate: 34%]

Workshops and Abstracts (Selected)

19. Deshmukh, N., **Rivaz, H.**, Boctor, E. "GPU-Based Elasticity Imaging Algorithms", MICCAI-Grid Workshop, London, UK (in press)
20. **Rivaz, H.**, Foroughi, P., Boctor, E., Zellars, R., Fichtinger, G., Hager, G., "High Resolution Ultrasound Elastography: a Dynamic Programming Approach", MICCAI Workshop, Brisbane, Australia, Oct. 2007, pp 113-121
21. **Rivaz, H.**, Foroughi, P., Boctor, E., Zellars, R., Fichtinger, G., Hager, G., "Toward Real-Time 2D Ultrasound Elastography Using Global Optimization of a Regularized Displacement Field", 6th Int. elastography Conf., Santa Fe, NM, Nov. 2007, p 137 (oral presentation)
22. **Rivaz, H.**, Hager, G., Zellars, R., Fichtinger, G., Boctor, E., "Speckle Characterization and Out-of-Plane Motion Estimation in Tissue", 6th Int. elastography Conf., Santa Fe, NM, Nov. 2007, p 116 (oral presentation)
23. **Rivaz, H.**, Rohling, R., "Design of a hand-held probe for vibro-elastography," 4th Int. elastography Conf., Austin, TX, Oct. 2005, p 61 (oral presentation)

SELECTED COURSES

Computer Science & Biomedical: Computer Vision, Advanced Computer Vision, Advanced Topics in Machine Learning, Image Analysis, Medical Imaging, Surgery for Engineers, Computer Integrated Surgery I & II, Seminar in Computer Integrated Surgery

Mathematics & Engineering: Digital Signal Processing, Partial Differential Equations, Matrix Analysis, Linear Optimization, Nonlinear Optimization, Control Sensors and Actuators, Robotics

PROFESSIONAL ACTIVITIES

- IEEE Trans. Medical Imaging (IEEE TMI), IEEE Trans. Biomed. Eng. (IEEE TBME) and Medical Image Computing and Computer Assisted Intervention (MICCAI) Peer Reviewer
- IEEE, MICCAI and SPIE Medical Imaging student member
- Elected as a student leader in 2006-2007 and 2007-2008 academic years in the computer science department at the Johns Hopkins University. Responsibilities included managing departmental budget for improving graduate student life