Jered R Wells

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Education

Doctor of Philosophy

Medical Physics ▪ Duke University ▪ Durham, NC ▪ Candidate

- Advisor: Dr. James T. Dobbins III
- Diagnostic Imaging focus
- (Proposed) dissertation title - *Correlated Polarity Noise Reduction: Development and Assessment of a Novel Nonlinear Noise Reduction Algorithm*

Bachelor of Arts

Physics ▪ Summa Cum Laude ▪ Central College ▪ Pella, IA ▪ 2008

- Advisors: Drs. Viktor Martisovits, Paul Naour, and Mark Johnson
- Math and Psychology minors
- Senior honors thesis title - *Image Analysis: Building a Rabbit MRI Brain Atlas*
- Study Abroad (London, UK)

Research Experience

PhD Researcher

Duke University ▪ Durham, NC ▪ 2008-Present

- Mentored by Dr. James T. Dobbins, III, Carl E. Ravin Advanced Imaging Laboratories
- Formulated novel motion correction techniques for a lower-cost CT system
- Simulated x-ray scatter and radiographic antiscatter grids with the PENELOPE suite of Monte Carlo simulation software
- Contributed to the development of correlated polarity noise reduction (CPNR)
- Generalized 1-D MTF measurement methodologies for the estimation of 2-D MTF
- Created a unique collection of tools for the evaluation of linear and nonlinear image processing algorithms – specifically their resolution and distortion properties

Graduate Researcher

University of Wisconsin, Madison ▪ Madison, WI ▪ 2011

- Supervised by Dr. Charles Mistretta, Medical Physics
- Studied HYPR and VIPR techniques applied to magnetic resonance angiography
- Investigated possible hybridization of CPNR with HYPR to improve SNR

Summer Intern

West Virginia University ▪ Morgantown, WV ▪ 2007

- Mentored by Drs. Bernard Schreurs and Susan Lemiux, WVU Center for Neuroscience
- Operated GE Signa Excite 3T MRI
- Examined ventricular volume changes in the rabbit model of human Alzheimer's disease
- Used neuroscience software for data analysis (AFNI, FSL, etc.)
- Developed and programmed techniques for automated image segmentation and ventricular volume measurement using MATLAB

Honorary Laboratory Assistant

University College London ▪ London, UK ▪ 2005

- Supervised by Dr. Katherine Jeffery, Jeffery Laboratory
- Observed experimental studies of the rat hippocampus and its role in spatial memory formation and retrieval tasks
- Assisted in data collection from in vivo hippocampal place cells
- Used MATLAB in data collection and analysis

Teaching Experience

Graduate Teaching Assistant

Duke University ▪ Durham, NC ▪ 2010-2011

- Graduate-level Advanced Medical Imaging Physics (MEDPHY 331)
- Implemented “one-minute essays” and blogs (see Teaching Statement)
- Conducted interactive test review sessions
- Wrote homework assignments
- Graded assignments, tests, and presentations
- Held regular office hours

Undergraduate Teaching and Laboratory Assistant

Central College ▪ Pella, IA ▪ 2006-2008

- Undergraduate-level General Physics I and II (PHYS 111 and PHYS 112)
- Directed one out-of-class help session per week
- Implemented practice quizzes and tests as teaching and discussion aids
- Graded papers, homework, quizzes and tests (average of two assignments per week for 45 students)
- Taught proper laboratory and experimental procedure
- Led and guided experiments; Assessed weekly laboratory reports

Upward Bound Tutor-Counselor

Central College ▪ Pella, IA ▪ 2005

- Served under the Central College Upward Bound Pre-College Program
- Mentored 14 young men as a resident adviser
- Taught introductory college-level physics and calculus to 16 high school students

- Designed physics laboratories covering general mechanics
- Coached, organized, and supervised athletic events, service projects, and field trips for 114 students (UB Summer Schedule 2005)

Honors and Awards

Duke University

Certificate in College Teaching ▪ In progress
Director's Award for Exemplary Service (Medical Physics) ▪ 2013
Carey E. Floyd Graduate Fellowship (Medical Physics) ▪ 2012
Excellence in Teaching Assistantship Award (Medical Physics) ▪ 2011, 2012
NIH Cross-disciplinary Training Grant in Medical Physics (TG32 EB007185) ▪ 2009-2011
Duke Medical Physics PhD Fellowship ▪ 2008-2009

Central College

Richard J. Mentink Award in Physics ▪ 2008
Psi Chi National Honor Society in Psychology ▪ 2006-2008
Iowa Conference All-Academic Track Team ▪ 2006
Varsity Letter Award, Track and Field ▪ 2005,2006
Alpha Zeta Mu Honor Society ▪ 2005-2006
Central College Leadership Development Institute ▪ 2005
Collegiate All-American Scholar ▪ 2005
H.S. Kuyper Full Tuition Scholarship ▪ 2004-2008
Robert C. Byrd Honors Scholar ▪ 2004-2008
Thrivent Financial for Lutherans Scholarship ▪ 2004-2008
Dean's List ▪ 2004-2008
National Dean's List ▪ 2004
State of Iowa Scholar ▪ 2004

Leadership Activities

Duke University

Carl E. Ravin Advanced Imaging Laboratories Student Representative ▪ 2012-Present
Ad Hoc Reviewer, Medical Physics ▪ 2012
Medical Physics Recruitment Committee ▪ 2011-Present
Medical Physics Student Handbook Executive Editor ▪ 2009-2011
Medical Physics Student Advisory Board ▪ 2009-2010
Medical Physics Liaison to the Graduate School Association ▪ 2009-2010
Medical Physics Student Mentorship Coordinator ▪ 2009-2010

Central College

Psi Chi Vice President (elect), Psi Chi President (*pro tempore*) ▪ 2007
Campus Ministries Worship Team (bassist) ▪ 2006-2008
Campus Ministries Executive Team ▪ 2006-2008
Leadership Development Institute ▪ 2005
Pietenpol Dormitory Hall Council ▪ 2004-2005

Intervarsity Technology Team ▪ 2004-2005
Central College Honors Program ▪ 2004-2008

Publications

Wells, J. R. & Dobbins, J. T. III. (2013). Frequency response and distortion properties of nonlinear image processing algorithms and the importance of imaging context. Medical Physics 40(9). [In press]

Wells, J. R. & Dobbins, J. T. III. (2012). Estimation of the two-dimensional presampled modulation transfer function of digital radiography devices using one-dimensional test objects. Medical Physics 39(10): 6148-6160.

Lemieux, S. K., Smith-Bell, C. A., **Wells, J. R.**, Ezerioha, N. M., Carpenter, J. S., Sparks, D. L. & Schreurs, B. G. (2010). Neurovascular changes measured by time-of-flight MR angiography in cholesterol-fed rabbits with cortical amyloid beta-peptide accumulation. J Magn Reson Imaging 32(2): 306-314.

Presentations

Wells, J. R., Segars, W. P., & Dobbins, J. T. III. TH-A-103-10 : Improved Segmentation of Low-Contrast Fibroglandular Structures in High-Noise Breast CT Volumes for XCAT Modeling. 55th Annual Meeting of the AAPM, 2013 August 4-8, Indianapolis, IN. Hendee, W. R. (Ed.). (Oral presentation)

Wells, J. R. & Dobbins, J. T. III. TU-A-218-01: Estimation of the 2-D presampled MTF of a digital flat panel detector using an edge test device. 54th Annual Meeting of the AAPM, 2012 July 29 – August 2, Charlotte, NC. Hendee, W. R. (Ed.). Medical Physics 39(6): 3894. (Oral presentation)

Wells, J. R. & Dobbins, J. T. III. A closed-form, analytical solution to 3-D motion correction in lower-cost CT. MEDPHY 370: Frontiers in Biomedical Science; 2012 April 4, Duke University, Durham, NC. (Invited Presentation)

Wells, J. R., Segars, W. P., Kigongo, C. J. N. & Dobbins, J. T. III. A new approach to motion correction applied to lower-cost CT for the developing world. 2010 Memphis Bioimaging Symposium, 2010 November 4-5, Memphis, TN. (Poster presentation - **Honorable Mention**)

Wells, J. R., Segars, W. P., Frush, D. P., McAdams, H. P., Kigongo, C. J. N. & Dobbins, J. T. III. A post-acquisition motion correction strategy for lower-cost computed tomography for the developing world. 2010 NIBIB Training Grantees Meeting, 2010 June 24-25, Bethesda, MD. (Invited presentation)

Conference Proceedings

Wells, J. R. & Dobbins, J. T. III. Preliminary investigation of the frequency response and distortion properties of nonlinear image processing algorithms. SPIE Medical Imaging 2013, Physics of Medical Imaging; 2013 February 9-14; Lake Buena Vista, FL. Nishikawa, R. M. & Whiting, B. R. (Eds.), 8668. Bellingham, WA: SPIE – The International Society for Optical Engineering; 2013 March. (Oral presentation)

Dobbins, J. T. III, **Wells, J. R.**, & Segars, W. P. Dose reduction in CT with correlated-polarity noise reduction: comparable image quality at half the dose with projection space processing. SPIE Medical Imaging 2013, Physics of Medical Imaging; 2013 February 9-14; Lake Buena Vista, FL. Nishikawa, R. M. & Whiting, B. R. (Eds.), 8668. Bellingham, WA: SPIE – The International Society for Optical Engineering; 2013 March. (Oral presentation)

Dobbins, J. T. III & **Wells, J. R.** Correlated-polarity noise reduction: feasibility of a new statistical approach to reduce image noise. SPIE Medical Imaging 2011, Physics of Medical Imaging; 2011 February 12-17; Lake Buena Vista, FL. Samei, E. & Pelc, N. J. (Eds.), 7961. Bellingham, WA: SPIE – The International Society for Optical Engineering; 2011 March. (Oral presentation)

Wells, J. R., Segars, W. P., Kigongo, C. J. N. & Dobbins, J. T. III. Refinement of motion correction strategies for lower-cost CT for under-resourced regions of the world. SPIE Medical Imaging 2011, Physics of Medical Imaging; 2011 February 12-17; Lake Buena Vista, FL. Samei, E. & Pelc, N. J. (Eds.), 7961. Bellingham, WA: SPIE – The International Society for Optical Engineering; 2011 March. (Poster presentation)

Dobbins, J. T. III, **Wells, J. R.**, Segars, W. P., Li, C. M. & Kigongo, C. J. N. Initial investigation into lower-cost CT for resource limited regions of the world. SPIE Medical Imaging 2010, Physics of Medical Imaging; 2010 February 13-18; San Diego, CA. Samei, E. & Pelc, N. J. (Eds.), 7622. Bellingham, WA: SPIE – The International Society for Optical Engineering; 2010 April. (Poster presentation)

Skills

Computing

MATLAB; GUI design; ImageJ/FIJI; Monte Carlo Software (PENELOPE); C; FORTRAN 77; LINUX; Mathematica; HTML; Web design; Microsoft Office Suite; Adobe Photoshop.

Equipment

GE Revolution XQ/i; (Prototype) GE Chest Tomosynthesis Unit; GE Signa 3T MRI.

Other

Dark room technique; Digital and film photography; Electronics (analog and digital circuitry); Welding (stick, MIG, and brazing); Carpentry; Construction.

Professional Membership

The International Society for Optics and Photonics (SPIE)
The American Association of Physicists in Medicine (AAPM)
The Southeastern Chapter of the AAPM (SEAAPM)