

# Danielle F. Pace

Ph.D. Candidate  
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## EDUCATION:

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**Ph.D. Candidate, Computer Science** Sept 2013–Present

**Massachusetts Institute of Technology**, Cambridge, MA, USA

Advisor: Dr. Polina Golland

GPA: 4.8/5.0

- Developing new image segmentation techniques based on machine learning, specifically aiming to segment cardiac structures from MRI for patients with complex congenital heart disease.

**M.E.Sc., Biomedical Engineering** Sep 2007–Mar 2010

**University of Western Ontario and Robarts Research Institute**, London, ON, Canada

Advisor: Dr. Terry Peters

GPA: 3.98/4.0

- Thesis: “Real-time 4D ultrasound reconstruction for image-guided intracardiac interventions”
- Created a 4D ultrasound reconstruction method to image the beating heart during minimally-invasive cardiac surgery, and integrated it into an augmented reality environment for interventional guidance.

**B.Cmp.H., Biomedical Computing** Sep 2003–Apr 2007

**Queen’s University**, Kingston, ON, Canada

Advisor: Dr. Randy Ellis

GPA: 4.15/4.3

- Final project: “Visualization for computer-assisted image-free total hip replacement”

## RESEARCH AND PROFESSIONAL EXPERIENCE:

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**Visiting Ph.D. Candidate** Jun 2017–Aug 2017

**Philips Research**, Hamburg, Germany

Advisor: Dr. Jürgen Weese

- Developed and tested deep learning algorithms to segment 2D and 3D cardiac MR images as part of Ph.D. research.

**Research and Development Engineer** Jul 2010–Jun 2013

**Kitware Inc.**, Carrboro, NC, USA

Advisor: Dr. Stephen Aylward

- Developed new deformable image registration methods to more accurately model the sliding motion of the lungs and abdominal organs.
- Software development for a major orthopedic device manufacturer, focusing on implant design evaluation and bone morphological population analysis. Collaborated directly with the customer’s research team to design and implement analyses. Progressed to co-lead, including project management, requirements generation and budgeting.
- Led and wrote two successful NIH STTR research grants as well as successful commercial consulting proposals.

**Research Assistant** May 2007–Aug 2007

**Brigham & Women’s Hospital and Harvard Medical School**, Boston, MA, USA

Advisor: Dr. Nobuhiko Hata

- Developed a tutorial module for hands-on training in image-guided therapy and medical robotics, using 3D Slicer and a LEGO Mindstorms NXT robot to simulate a needle biopsy.

**Research Assistant** May 2007–Aug 2007

**Department of Physiology, Queen’s University**, Kingston, ON, Canada

Advisor: Dr. Ken Rose

- Used computational models of single motoneurons to investigate how asynchronous background synaptic activity affects noise in the cell’s membrane potential, and when this in turn affects its firing rate.

## TEACHING EXPERIENCE:

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### **“Introduction to Inference”**

Sep 2016–Dec 2016

Teaching Assistant, Massachusetts Institute of Technology

- Taught recitations, ran office hours, developed material for problem sets, labs and exams, and grading.

### **“Algorithms and Data Structures for Object-Oriented Design”**

Jan 2009–Apr 2009

Teaching Assistant, The University of Western Ontario

- Designed and graded major assignments and weekly labs, and ran laboratory hours.

### **Training Specialist**

Mar 2008–Dec 2008

#### **Consulting to National Center for Image-Guided Therapy (NCIGT)**

- Developed new tutorial presentations about using 3D Slicer for image analysis and image-guided therapy.
- Taught groups of new users and software developers in interactive training workshops in Germany and Canada.

### **“Programming Fundamentals for Engineers”**

Sep 2007–Dec 2007

Teaching Assistant, The University of Western Ontario

- Taught core principles and debugging strategies to novice programmers, individually and in small groups.

## AWARDS:

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- **Best Presentation**, New England Computer Vision Workshop, 2018.
- **NSERC Canada Graduate Scholarship (Doctoral)**, 2013-2016 (\$63,000).
- **Best Poster**, International Society for Computer Aided Surgery, Computer Assisted Radiology and Surgery, 2010.
- **1<sup>st</sup> Poster in Imaging for Cardiovascular Therapeutics**, 7<sup>th</sup> Symposium of Imaging Network Ontario, 2008.
- **NSERC Canada Graduate Scholarship (Master’s)**, 2007-2009 (\$35,000).
- **Ontario Graduate Scholarship**, Government of Ontario, 2007 (\$15,000, declined for NSERC).
- **Advanced Undergraduate Project Award**, School of Computing, Queen’s University, 2007.
- **Best Undergraduate Contribution**, Canadian Student Conference on Biomedical Computing, 2006.
- **HSBC Bank Malta Undergraduate Scholarship (Canadian Branch)**, 2003-2007 (\$10,000).
- **Principal’s Scholarship in Computing**, Queen’s University, 2003-2005 (\$8,000).

## SERVICE:

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### **Organizing Committee:**

- **HVSMR Challenge, MICCAI 2016**: “Workshop on Whole-Heart and Great Vessel Segmentation from 3D Cardiovascular Magnetic Resonance Images in Congenital Heart Disease”.

### **Reviewer:**

- IEEE Transactions on Medical Imaging (TMI).
- Medical Image Computing and Computer Assisted Intervention (MICCAI).
- Journal of Cardiovascular Magnetic Resonance (JCMR).
- Information Processing in Computer Assisted Interventions (IPCAI).
- International Journal of Medical Robotics and Computer Assisted Surgery.
- MICCAI Workshop on Computational and Clinical Applications in Abdominal Imaging.
- MICCAI Workshop on Clinical Image-Based Procedures: From Planning to Intervention.

### **Volunteer:**

- **MICCAI Student Board**: Advisory Member 2018-2019, Educational Officer 2017-2018, Professional Students Event Officer 2016-2017, Executive Member 2015-2016.
- **MIT Canadians Club**: Deputy Prime Minister 2014-2015 and 2016-2017; Minister of Finance 2015-2016.

## PEER-REVIEWED JOURNAL PUBLICATIONS:

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1. **D.F. Pace**, S.R. Aylward, M. Niethammer, "A locally adaptive regularization based on anisotropic diffusion for deformable image registration", IEEE Transactions on Medical Imaging; 32(11): 2114-2126, 2013.
2. A. Irimia, B. Wang, S. Aylward, M. Prastawa, **D.F. Pace**, M. Niethammer, G. Gerig, D.A. Hovda, R. Kikinis, P.M. Vespa, J.D. Van Horn, "Multimodal neuroimaging of structural pathology and neuroconnectivity in traumatic brain injury: towards personalized outcome prediction", NeuroImage: Clinical; 1:1-17, 2012.

## PEER-REVIEWED CONFERENCE PROCEEDINGS:

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3. **D.F. Pace**, A.V. Dalca, T. Brosch, T. Geva, A.J. Powell, J. Weese, M.H. Moghari, P. Golland, "Iterative segmentation from limited training data: Applications to congenital heart disease", MICCAI Workshop on Deep Learning in Medical Image Analysis, LNCS 11045:334-342, 2018.
4. **D.F. Pace**, A.V. Dalca, T. Geva, A.J. Powell, M.H. Moghari, P. Golland, "Interactive whole-heart segmentation in congenital heart disease", Medical Image Computing and Computer Assisted Interventions (MICCAI), LNCS 9351:80-88, 2015.
5. R. Kwitt, **D.F. Pace**, M. Niethammer, S.R. Aylward, "Studying cerebral vasculature using structure proximity and graph kernels", Medical Image Computing and Computer Assisted Interventions (MICCAI), LNCS 8150:534-541, 2013.
6. **D.F. Pace**, M. Niethammer, S.R. Aylward, "Sliding geometries in deformable image registration", MICCAI Workshop on Computational and Clinical Applications in Abdominal Imaging, LNCS 7029:141-148, 2011.
7. M. Niethammer, G.L. Hart, **D.F. Pace**, P.M. Vespa, A. Irimia, J.D. Van Horn, S.R. Aylward, "Geometric Metamorphosis", Medical Image Computing and Computer Assisted Interventions (MICCAI), LNCS 6892:639-646, 2011.
8. **D.F. Pace**, A. Enquobahrie, H. Yang, S.R. Aylward, M. Niethammer, "Deformable image registration of sliding organs using anisotropic diffusive regularization", International Symposium on Biomedical Imaging (ISBI), 30:407-413, 2011.
9. T. Peters, **D.F. Pace**, P. Lang, G. Guiraudon, D. Jones, C. Linte, "Ultrasound image guidance of cardiac interventions", Proceedings of SPIE Medical Imaging; 7968:79680T, 2011.
10. C.A. Linte, M. Carias, S.D. Cho, **D.F. Pace**, J. Moore, C. Wedlake, D. Bainbridge, B. Kiaii, T.M. Peters, "Estimating heart shift and morphological changes during minimally invasive cardiac interventions", Proceedings of SPIE Medical Imaging; 7625:762509, 2010.
11. **D.F. Pace**, D.G. Gobbi, C. Wedlake, J. Gumprecht, J. Boivert, J. Tokuda, N. Hata, T.M. Peters, "An open-source real-time ultrasound reconstruction system for four-dimensional imaging of moving organs", MICCAI Workshop on Systems and Architectures for Computer Assisted Intervention, 2009.
12. J. Moore, C. Clarke, D. Bainbridge, C. Wedlake, A.D. Wiles, **D.F. Pace**, T.M. Peters, "Image guidance for spinal facet injections using tracked ultrasound", Medical Image Computing and Computer Assisted Interventions (MICCAI), LNCS 5761:516-523, 2009.
13. T.M. Peters, C.A. Linte, J. Moore, A. Wiles, J. Lo, **D.F. Pace**, C. Wedlake, D. Bainbridge, D.L. Jones, G.M. Guiraudon, "Cardiac imaging and modeling for guidance of minimally invasive beating heart interventions", Functional Imaging and Modeling of the Heart, LNCS 5528:466-475, 2009.
14. **D.F. Pace**, A.D. Wiles, J. Moore, C. Wedlake, D.G. Gobbi, T.M. Peters, "Validation of four-dimensional ultrasound for targeting in minimally-invasive beating-heart surgery", Proceedings of SPIE Medical Imaging; 7261:726115, 2009.
15. J. Jomier, L. Ibanez, A. Enquobahrie, **D.F. Pace**, K. Cleary, "An open-source testing framework for tracking devices using Lego Mindstorms™", Proceedings of SPIE Medical Imaging; 7261:72612S, 2009.
16. **D.F. Pace**, R. Kikinis, N. Hata, "An accessible, hands-on tutorial system for image-guided therapy and medical robotics using a robot and open source software", MICCAI Workshop on Open Source and Open Data, 2007.

## PEER-REVIEWED CONFERENCE ABSTRACTS:

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17. **D.F. Pace**, Polina Golland, David Annese, Tal Geva, Andrew J. Powell, M.H. Moghari, "Creating 3D heart models of children with congenital heart disease using magnetic resonance imaging", International Society for Magnetic Resonance in Medicine (ISMRM), 2015.
18. Y. Dai, **D.F. Pace**, J. Bischoff, "Anthropometric differences in natural posterior tibial slope", Orthopaedic Research Society (ORS), 2014.
19. **D.F. Pace**, A. Enquobahrie, P. Reynolds, J. Jomier, E. Bullitt, S.R. Aylward, "TubeTK: An open-source toolkit of algorithms operating on images of tubes", 26<sup>th</sup> International Congress and Exhibition on Computer Assisted Radiology and Surgery (CARS), International Journal of CARS; 7 (S1):S79-S80, 2012.
20. **D.F. Pace**, D. Bainbridge, J. Moore, C. Wedlake, G. Guiraudon, D.L. Jones, T.M. Peters, "Real-time 4D ultrasound reconstruction for improved intraoperative imaging during image-guided beating-heart interventions", 24<sup>th</sup> International

Congress and Exhibition on Computer Assisted Radiology and Surgery (CARS), International Journal of CARS; 5(S1):S271-S273, 2010 (won *International Society for Computer Aided Surgery (ISCAS) Best Poster award*).

21. C.A. Linte, D.S. Cho, M. Carias, **D.F. Pace**, J. Moore, C. Wedlake, D. Bainbridge, B. Kiaii, T.M. Peters, "Estimating heart movement and morphological changes during robot-assisted coronary artery bypass graft interventions", 24<sup>th</sup> International Congress and Exhibition on Computer Assisted Radiology and Surgery (CARS), 2010.
22. **D.F. Pace**, T. Bui, P.K. Rose, "Computational estimates of the effect of asynchronous synaptic activity on fluctuations in the membrane potential of motoneurons", Society for Neuroscience (SfN), 2006.