Darrell J. Swenson

PhD Candidate Bioengineering, University of Utah
Scientific Computing and Imaging Institute

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Professional Preparation

- B.S. in Mechanical Engineering, 1998-2005, Brigham Young University, Provo, UT
- Ph. D. in Bioengineering, 2007-Spring 2012 (expected), University of Utah, Salt Lake City, UT, Scientific Computing and Imaging Institute

Research Interests

- Patient-Specific Modeling, Computational Electrophysiology, Finite Element Meshing, CAx Tool Integration, Parametric CAD Modeling

Work Experience

- **Research Assistant**, *U of U Scientific Computing and Imaging Institute, Salt Lake City, UT, Aug 07-Present*
  - o Create subject-specific models of acute cardiac ischemia
  - o Investigate experimentally cardiac ischemic disease
  - o Develop open-source meshing software BioMesh3D
  - o Support and develop simulation and visualization software SCIRun
  - o Develop a forward/inverse bioelectric simulation tool kit
- **Structural Methods Engineer**, *Pratt &Whitney, E. Hartford, CT, May 05-Aug 07*
  - o Support structural design studies for commercial and military engines
  - o Develop and maintain airfoil multidisciplinary optimization tools for blade tuning
  - o Enhance automated FE meshing and preprocessing tools
  - o Evaluate providence capturing and automation tools
- **Research Assistant**, *BYU ParaCAD Lab, Provo, UT, Aug 04-Apr 05*
  - o Research CAx tool integration
  - o Apply collaborative software to engineering standard work
  - o Develop automated ANSYS structural analysis tools
- ***Internship – Structural Methods Engineer***, *Pratt & Whitney, E. Hartford, CT, May 04 - Aug 04*
  - o Aid development of a conceptual design analysis tool for jet engines
  - o Research and test collaborative software such as FIPER, CO and Team Center
  - o Craft documents and tutorials on newly developed procedures

Teaching Experience

- BE 6000- Physiology for Engineers I (TA), University of Utah, Jan 11-May 11
  - o Instruct students, prepare labs and evaluate student lab reports
  - o Teach class lectures as needed
- ME EN 371 Computer-Aided Engineering Applications (TA), Brigham Young University, Sep 03-May 04
  - o Teach two hour lectures on CAD modeling techniques as needed
  - o Answer individual questions for over 100 students
- ME EN 578 CAD/CAM Applications (TA), Brigham Young University, Sep 04-Dec 04
  - o Advise student groups
  - o Teach student sections with supplemental instruction
- ME EN 570 CAD/CAM Applications (Volunteer), Brigham Young University, Jan 05-May 05
  - o Assisted with multiple class lectures

Publications

- **Darrell Swenson**, Sarah E. Geneser, Jeroen G. Stinstra, Robert M. Kirby, Rob S. MacLeod. Cardiac Position Sensitivity Study in the Electrocardiographic Forward Problem Using Stochastic Collocation and Boundary Element Methods. *Annals of Biomedical Engineering*, pages 1–11, 10.1007/s10439-011- 0391-5, 2011.

- R.S. MacLeod, J.G. Stinstra, S. Lew, R.T. Whitaker**, D.J. Swenson**, M.J. Cole, J. Krueger, D.H. Brooks, and C.R. Johnson. Subject-specific, multiscale simulation of electrophysiology: a software pipeline for image based models and application examples. *Phil. Trans. R. Soc*. 367:2293-2310, 2009.

- BM Burton, JD Tata, B Erem, **DJ Swenson**, DF Wang, DH Brooks, PM vn Dam, RS Macleod. Forward/Inverse toolkit in the SCIRun problem solving environment. *EMBC: IEEE Engineering in Medicine and Biology*, 2011.

- Joshua A. Levine, Zhisong Fu, **Darrell Swenson**, Rob S. MacLeod and Ross T. Whitaker. A comparison of Delaunay-based meshing algorithms for electrophysical cardiac simulation. *VPH: Virtual Physiological Human*, 2010.

- **Darrell Swenson**, Josh Levine, Zhisong Fu, Jess Tate, Rob MacLeod. The Effect of Non-Conformal Finite Element Boundaries on Electrical Monodomain and Bidomain Simulations. *Computing in Cardiology 2010*.

- **DJ Swenson**, JG Stinstra, BM Burton, KK Aras, Lindsey Healy RS MacLeod. Evaluating the Effects of Border Zone Approximations with Subject Specific Ischemia Models. *World Congress on Med. Phys. and Biomed. Eng.*, volume 25/IV, pages 1680–1683, Heidelberg, 2009. Springer.

- **DJ Swenson**, JG Stinstra, BM Burton, KK Aras, RS MacLeod. Wave Equation Based Interpolation on Volumetric Cardiac Electrical Potentials. In A. Murray, editor, *Computers in Cardiology 2009*, pages 217–220, 2009.

- KK Aras, S Shome**, DJ Swenson**, JG Stinstra, RS MacLeod. Electrocardiographic Response of the Heart to Myocardial Ischemia. In A. Murray, editor, *Computers in Cardiology 2009*, pages 105–108, 2009.

- JJE Blauer, **D Swenson**, C Gloschat, J Stinstra, NF Marrouche, RS MacLeod. Visualization of Lesion Transmurality following Radio-Frequency Ablation of Atrial Fibrillation. Computers in Cardiology 2009.

Conference Presentations

- *Utah Biomedical Engineering Conference 2011 - Podium Presentation – Salt Lake City, UT.* A Comprehensive Study of Non-conformal Meshing on Bioelectric Simulations.

- *Computing in Cardiology 2010 - Podium Presentation - Belfast, N. Ireland.* The Effect of Non-Conformal Finite Element boundaries on Electrical Monodomain and Bidomain Simulations

- *Mountain West Biomedical Engineering Conference 2010 - Podium Presentation - Park City, UT.* Cardiac Position Sensitivity Using general Polynomial Chaos-Stochastic Collocation (gPC-SC)

- *World Congress of Biomedical Engineering and Medical Physics 2009- Podium Presentation - Munich, Germany.* Evaluating the Effects of Border Zone Approximations with Subject Specific Ischemia

- *Computers and Cardiology 2009- Podium Presentation - Park City, UT.* Wave Equation Based Interpolation on Volumetric Cardiac Electrical Potentials

- *Mountain West Biomedical Engineering Conference 2008- Poster Presentation - Park City, UT.* Subject specific modeling pipeline of acute cardiac ischemia

Student Projects Supervised

- Ayla Khan- GPU implementation of Reaction Diffusion Simulations

- Amir Ali Ghaffarian- Validation of Myocardial Helical Angle Interpolation

- Joshua Schwermer and Joemy Ramsay- Automated Electrode Detection from MRI imaging

- Spencer Thurman- Statistical Quantification of Electrical Conductivity Changes in Hypo-Enhanced Cardiac MRI Images

Volunteer
- SCI Institute Tour Guide to middle-school students and other young student groups including scouts
- Conference Proceedings Technical Support, Computers in Cardiology, Park City
- Volunteer Representative, Portugal, The Church of Jesus Christ of Latter-day Saints, Mar. 99 – Mar. 01
  Language: Portuguese

Honors and Awards
- Boeing Scholar
- Departmental Scholarship
- Pratt and Whitney Eagle Award
- University Travel Award
- Eagle Scout

Computer Experience
- Programming/Platforms
  C++, Open GL, Python, UG's API, ITK, TEEM, Windows, UNIX, Mac
- Simulation/Meshing
  ANSYS, Tetgen, Biomesh3D, CGAL, DELPSC, SEG3D, Adams Car, SCIRun, CHASTE, CARP, Matlab
- Optimization/Tool integration
  CO, FIPER, iSIGHT, TEAM Center, SCIRun
- Other
  Latex, MS Word, iWork, Adobe Photoshop/Illustrator

Team Projects
- Capstone Senior Design Project
  - Collaborative vehicle design project for General Motors
  - Oversee the development of suspension using ADAM's Car software

- Pratt & Whitney Student Project
  - Integrated Unigraphics, ANSYS, and iSIGHT to develop a planetary gear optimizing tool
  - Programmed graphical user interfaces and 3-D graphics in C++

Interests
- Classical Guitar, Auto Mechanics, Mt. Biking, Music, Disc Golf