Robert (Rob) S. MacLeod Professor of Biomedical Engineering and Internal Medicine

Date: February 15, 2024



Personal Data

Name:	Robert (Rob) Scott MacLeod	
Address:	Scientific Computing and Imaging (SCI) Institute	
	Warnock Engineering Building, Rm 3750.	
	University of Utah,	
	Salt Lake City,	
	Utah, 84112	
Place of Birth:	Inverness, Nova Scotia	
Date of Birth:	August 22, 1955	
Citizenship:	Dual Canadian and U.S.	

Education

Date	Degree	Institution
1979	B.Sc., Engineering Physics	Dalhousie University,
	- with high honors	Halifax, N.S., Canada
1985	Diplom-Ingenieur (M.Sc.), Electrical Engineering	Technische Universität Graz,
	- with excellence	Graz, Austria
1990	Ph.D., Physiology and Biophysics	Dalhousie University,
		Halifax, N.S., Canada
1990–92	Postdoctoral Fellowship	CVRTI,
		University of Utah,
		Salt Lake City, Utah

Professional Experience

Full-time Positions

Date	Position	Institution
2012-	Full Professor	Scientific Computing & Imaging Institute
		Biomedical Engineering Department,
		University of Utah, Salt Lake City, Utah
2012-	Adjunct Professor	
	Cardiovascular Medicine	University of Utah, Salt Lake City, Utah
2003-2012	Associate Professor with tenure	Scientific Computing & Imaging Institute
		Bioengineering Department,
		University of Utah, Salt Lake City, Utah
1999–2003	Assistant Professor (tenure-track)	Department of Bioengineering,
		University of Utah, Salt Lake City, Utah
1998–2012	Research Associate Professor	
	Internal Medicine/Cardiology	University of Utah, Salt Lake City, Utah
1992–98	Research Assistant Professor	
	Internal Medicine/Cardiology	University of Utah, Salt Lake City, Utah
1997-99	Research Assistant Professor	Department of Bioengineering,
		University of Utah, Salt Lake City, Utah
1993–97	Adjunct Research Assistant Professor	Department of Bioengineering,
		University of Utah, Salt Lake City, Utah
1980–86	Research Assistant Professor and	Institut für Medizinische Physik und Biophysik,
	Computer Engineer	Universität Graz, Graz, Austria

Editorial/Review Experience

Granting Agencies

University of Utah Seed Grants University ot Utah DEPHI Seed Grants American Heart Association (Western Affiliate study section 2000–2004) National Institutes of Health (NIH): special study sections for BISTI, NCRR P41, NCRR X02, NIBIB T32, Software hardening grants Health Research Council of New Zealand New Zealand Lottery Grants Australian Research Council The Whitaker Foundation Technology Foundation STW, The Netherlands Medical Research Council, Great Britain Fondation pour la Reserche Médical, France The Icelandic Centre for Research, Iceland Research Foundation - Flanders, Belgium Dutch Technology Foundation (STW), The Netherlands Austrian Science Fund (FWF), Austria Natural Sciences and Engineering Research Council of Canada The Research Council of Norway, Oslo, Norway The Netherlands Organisation for Scientific Research (NWO) Michigan State University Research Excellence Fund Coverage and Analysis Group, OCSQ, Centers for Medicare and Medicaid Services

Journals

Journal of Electrocardiology (editorial board member) European Soc. Cardiology Digital Health (editorial board member) **IEEE** Transactions on Biomedical Engineering **IEEE** Transactions on Medical Imaging **IEEE Signal Processing Magazine IEEE Visualization and Computer Graphics** Journal of the American Association of Cardiologists (JACC) Annals of Biomedical Engineering **Computers and Biomedical Research** Computer Methods and Programs in Biomedicine Circulation American Journal of Cardiology European Heart Journal Canadian Journal of Physiology Institute of Physics Publishing American Journal of Physiology **Biophysical Journal** Computational and Mathematical Methods in Medicine **EP** Europace Journal of the American College of Cardiology Medical & Biological Engineering & Computing

Conference Organizing

2022

Computing in Cardiology (CinC) 2022

President of CinC Board, Conference Organizing Committee, Session Chair International Society of Computerized Electrocardiology, 2022

Session Organizer, Poster Judge,

2021

Computing in Cardiology (CinC) 2021

President of CinC Board, Conference Organizing Committee, Session Chair International Congress in Electrocardiography, 2021

International Council, Young Investigator Competition Judge, Program Chair, and session chair
Function Imaging and Modeling of the Heart (FIMH) 2021
Program committee, session chair
2020
Computing in Cardiology (CinC) 2020
President of CinC Board, Conference Organizing Committee, Session Chair
International Congress in Electrocardiography, 2020
International Council, Young Investigator Competition Judge, Program Chair, and session chair
Canceled due to COVID-19
International Society for Computerized Electrocardiology (ISCE) 2020
Session organizer and Chair
Canceled due to COVID-19
IEEE Visualization Conference 2020
Spotlight Session organizer and plenary speaker
2019
Computing in Cardiology (CinC) 2019
President of CinC Board, Conference Organizing Committee, Session Chair
International Congress in Electrocardiography, 2019
International Council, Young Investigator Competition Judge, Program Chair, and session chair
Function Imaging and Modeling of the Heart (FIMH) 2019
Program committee, session chair
International Society for Computerized Electrocardiology (ISCE) 2019
Session organizer and Chair
2018
Computing in Cardiology (CinC) 2018
President of CinC Board, Conference Organizing Committee, Session Chair
International Congress in Electrocardiography, 2018
International Council, Young Investigator Competition Judge, Program Chair, and session chair
International Conference on Bioelectromagnetism 2018
Program committee
International Society for Computerized Electrocardiology (ISCE) 2018
Session organizer and Chair
2017
Computing in Cardiology 2017
Member of CinC Board, Poster Competition Chair, Conference Organizing Committee, Session Cl
Functional Imaging and Modeling of the Heart, 2017
Program Committee
International Congress in Electrocardiography, 2017
International Council, Young Investigator Competition Organizer, abstract chair, and session chair
Computing in Cardiology 2016
Member of CinC Board, conference organizing committee, session chair
International Congress in Electrocardiography, 2016
International Council and session chair
2015

Western AFib Symposium, 2015
Session Chair
International Society of Computerized Electrocardiology, 2015
Session organizer and invited speaker
International Congress in Electrocardiography, 2015
International Council and session chair
Noninvasive Functional Source Imaging (NFSI) 2015
Organizing committee and session chair
Computing in Cardiology 2015
Member of CinC Board, conference organizing committee, session chair
2014
Math Biosciences Institute; Integrating Modalities and Scales in Life Science Imaging, 2014
Conference Co-Chair and organizer
Western AFib Symposium, 2014
Co-chair and invited speaker
International Society of Computerized Electrocardiology, 2014
Workshon organizer and invited speaker
International Congress in Electrocardiography 2014
Program committee session chair
Computing in Cardiology 2014
Session chair and elected to CinC Board
2012
2015 International Congress in Electrocardiography 2013
Brogram committee, cassion choir and planary speaker
Frogram commutee, session chair and plenary speaker
Punctional Imaging and Modeling of the Heart 2015
Program committee
International Society for Biomedical Imaging (ISBI), 2013
Reviewer
Western AF1b Symposium, 2013
Co-chair and invited speaker
IEEE Engineering in Medicine and Biology Conference 2012
Track chair, session chair, workshop chair
International Society for Biomedical Imaging (ISBI), 2012
Program committee, session chair, reviewer, Challenge co-chair
Western AFib Symposium, 2012
Co-chair and invited speaker
2011
International Congress in Electrocardiology, 2011
Plenary speaker, session chair, web page support, organization
Functional Imaging and Modeling of the Heart 2011, Reviewer,
minisymposium organizer
2010
Computing in Cardiology 2010
Session chair

International Congress in Electrocardiography, 2010 Session chair and plenary speaker 2000-2009 Computers in Cardiology, 2009 Local organizing committee, Sunday Symposium, Scientific Program Functional Imaging and Modeling of the Heart, Program Committee, 2009 World Congress on Medical Physics and Biomedical Engineering, 2009 Scientific Program Committee, Track Chair International Congress on Electrocardiology, 2009 scientific planning committee and session chair Engineering in Medicine and Biology (EMBS), Track and Session chair, 2008 Engineering in Medicine and Biology (EMBS), Track and Session chair, 2007 International Congress on Electrocardiology, 2007 scientific planning committee and session chair International Congress on Electrocardiology, 2006 scientific planning committee and session chair Engineering in Medicine and Biology (EMBS) Track and Session chair, 2006 International Congress on Electrocardiology, 2005 scientific planning committee and session chair Noninvasive Functional Source Imaging (NFSI) 2005 Organizing committee and session chair Engineering in Medicine and Biology (EMBS) Track and Session chair, 2005 Engineering in Medicine and Biology (EMBS) Session chair, 2004 International Symposium on Biomedical Imaging (ISBE), Session chair, 2004 International Society for Computerized Electrocardiology, session chair 2003 International Congress on Electrocardiology, 2003 scientific planning committee and session chair Engineering in Medicine and Biology (EMBS) Session chair, 2002 International Society for Computerized Electrocardiology, session chair 2002 Engineering in Medicine and Biology (EMBS) session chair, 2001 Biomedical Engineering Society (BMES), session chair, 2000

Academic Honors

- 2020– Scientific Advisor for Personalize AF Consortium
- 2020– CVRTI Senior Advisory Council
- 2017 Fellow of the American Institute of Medical and Biological Engineers (AIMBE)
- 2017– President of Computing in Cardiology Society
- 2015– C0-Founder of the Consortium for ECG Imaging
- 1990–92 Heart and Stroke Foundation of Canada Postdoctoral Fellowship
- 1987–90 Medical Research Council of Canada Studentship
- 1986/87 IODE War Memorial Postgraduate Scholarship
- 1986–90 Izaak Walton Killam Memorial Scholarship
- 1980-85 Austrian Student Union Scholarships
- 1979 Dalhousie University Medal in Engineeringg Physics
- 1975–79 Dalhousie University Academic Scholarships

Academic Administrative Experience

University of Utah

Dates	Appointment/Organization	Entity at University of Utah
2022-	Director of Cardiovascular Engineering Track	BME Department
2022-	Teaching Effectiveness Working Group	University of Utah
2022-	Teaching & Learning Portfolio	University of Utah
2022-	DELPHI Group Steering Committee	University of Utah
2022-	Faculty Advisory Committee	
	Center for Teaching Excellence (CTE)	Learning Portfolio
2021-	Preclinical Imaging Core Facility	Univ. of Utah
	Oversight Committee	
2012-	Physics Education Committee (Chair)	College of Engineering
2010-	Graduate Program Committee Member	Biomedical Engineering Department
2006-	Director of Undergraduate Studies	Biomedical Engineering Department
	Associate Department Chair	
2003-	Associate Director	SCI Institute
2020-2022	Equality, Diversity, and Inclusivity Committee	College of Engineering
2007-2021	Small Animal Imaging Core Facility	Univ. of Utah
	Oversight Committee (Chair)	
2003-2020	Associate Director	CVRTI
2019/20	Co-Chair SCI Director Search Committee	Univ. of Utah
2016-20	MD/PhD Committee	School of Medicine
2015–19	RPT Committee Member	Biomedical Engineering Dept.
2014	RPT Guidelines Review Committee	Biomedical Engineering Dept.
2014	Internal Department Review	University of Utah
	of Biomedical Informatics	
2012-14	Faculty Search Committee	Bioengineering Department
2009–2015	Associate Director	University of Utah
	Comprehensive Arrhythmia &	
	MAnagement Center (CARMA)	
2003-2006	College Curriculum Committee (Chair)	College of Engineering
2002–2019	Graduate studies track chair	Bioengineering Department
2004	Physiology Chair Search Committee	School of Medicine
2004	Faculty Search Committee	SCI Institute
2003	CVRTI Director Search Committee	School of Medicine
2001–2003	College Council	College of Engineering
2001–2006	Graduate Program Committee	Bioengineering Department
2000-2001	Undergraduate Program Committee	Bioengineering Department
1999–2003	Interim Co-director	CVRTI
1999–2003	Curriculum Committee	College of Engineering
1990–2000	Computer Facilities Management	CVRTI

Other Institutions

Appointment/Organization	Institution
Graduate Education Committee	Department of Physiology and Biophysics,
	Dalhousie University
President, Graduate Student Society	Department of Physiology and Biophysics,
	Dalhousie University
Graduate Education Planning Committee	Department of Physiology and Biophysics,
	Dalhousie University
Space Planning Committee	Department of Physiology and Biophysics,
	Dalhousie University
Vice President,	Department of Physics,
Undergraduate Physics Society	Dalhousie University
	Appointment/Organization Graduate Education Committee President, Graduate Student Society Graduate Education Planning Committee Space Planning Committee Vice President, Undergraduate Physics Society

University and Community Activities

2006–2010	Board Member, Emigration Oaks Property Owners Association		
2003-2005	Board Member, Utah Symposium in Science and Literature		
2001	Judge for Salt Lake Valley Regional Science & Engineering Fair, hosted by		
	the university.		
1998–2001	Chair of Salt Lake City Mayor's Bicycle Advisory Committee		
1992–98	Vice Chair of Salt Lake City Mayor's Bicycle Advisory Committee		
1997	Planning Committee for the American Heart Association 1997 "Heart Ride"		
1997	Judging Panel, Salt Lake City Urban Design Awards		
1997–2000	Coordinator of "Cycle Salt Lake" annual bicycle festival		
1994–2010	Board of Trustees, Bonneville Shoreline Trail Committee		
1994–96	President, Rocky Mountain Cycling Club		
1992–95	University of Utah Parking Services and Public Transportation Advisory		
	Committee		
1991–94	University of Utah Campus Bicycle Committee (from 1992 as Chair)		
1991-2002	Salt Lake City Mayor's Bicycle Advisory Committee		

Membership in Professional Societies

AIMBE — American Institute of Medical and Biological Engineers (Fellow)

CinC — Computing in Cardiology, 2014 appointed to CinC Board, since 2018 as President

ISE — International Society of Electrocardiology, 2002-2020 Member of ISE Council, 2019 as Secretary

IEEE/EMBS — Engineering in Medicine and Biology Society (Lifetime member)

BMES — Biomedical Engineering Society

HRS — Heart Rhythm Society

ISBEM — International Society of Bioelectromagnetism

ISCE — International Society for Computerized Electrocardiography

ASEE — American Society for Engineering Education

Teaching Responsibilities/Assignments

Courses Taught

Date	Position	Institution
2023-	BIOEN 6000 System Physiology I: Cardiovascular,	Dept. of Biomedical Engi-
	respiratory, and renal systems	neering,
	Instructor, developer of this new course in systemic	University of Utah
	physiology for bioengineers. 20–30 students in the	
	class.	
2020–2022	BME 4992 Senior Project II	Dept. of BME,
	Instructor (one of 7) 12-15 senior undergraduate stu-	University of Utan
	search project and learn to present the results in the	
	form of a paper verbal presentations and poster	
	Also learn how to carry out reviews of scientific pa-	
	pers.	
2014-	BME 2100 Fundamentals of BME II	BME Department,
	Instructor, course coordinator. 100 sophomore stu-	University of Utah
	dents in the class, which is a prerequisite for admis-	
	sion to the BME program.	
2012-	BIOEN 6110 Biomedical Technology in Anesthesia	Departments of BME and
	and Critical Care	Anestnesiology,
	pletely povel course in the role of biomedical tech-	University of Otan
	nology in the clinical settings of the operation room	
	and critical care units. 10 students in the initial year	
	of the class, either graduate students or senior under-	
	graduates.	
2015-2019	BME 4720 Intro to Image Based Modeling	BME Department
	Co-Instructor, elective course for biomedical engi-	University of Utah
	neering students in the technology of image based	
	modeling, including image processing, segmenta-	
	tion, registration, geometric model construction, vi-	
2011-2018	BIOEN 6060 (now 7070) Graduate Proposal Writing	Dept of Bioengineering
2011 2010	and Presentation I	Dept. of Divengineering,
	Instructor, course coordinator, and developer of this	University of Utah
	completely revised course. 30 in the class, which is	-
	required for all PhD students in the Bioengineering	
	program.	
2012–2018	BIOEN 6061 (now 7071) Graduate Proposal Writing	Dept. of Bioengineering,
	and Presentation II	TT · · · · · · · · · · · · · · · · · ·
	instructor, course coordinator, and developer of this	University of Utah
	completely revised course. 50 in the Class, which is	
	program Second semester of the two-semester se-	
	ries.	

Date	Position	Institution
2008–2012	BIOEN 6003 Cellular Electrophysiology and	Dept. of Bioengineering and Physiology,
	Biophysics Instructor, course coordinator, and developer of this team taught course (4 instructors). 10– 12 students in the class. Taught first as a spe- cial topics course, this course is now part of the regular Biomedical Engineering curricu- lum. For more details, see the class web site at http://www.sci.utah.edu/~macleod/be6003/	University of Utah
2002–2014	BIOEN 6000 System Physiology I: Cardio- vascular, respiratory, and renal systems	Dept. of Bioengineering and Physiology,
	Instructor, developer of this new course in systemic physiology for bioengi- neers. 20–30 students in the class. For more details, see the class web site at http://www.sci.utah.edu/~macleod/be6000/	University of Utah
2001–2013	BIOEN 6460 Electrophysiology and Bioelec- tricity	Dept. of Bioengineering and Physiology,
	Instructor, course coordinator, and developer of this team taught course (4 instructors). 10– 12 students in the class. Taught first as a spe- cial topics course, this course is now part of the regular Biomedical Engineering curricu- lum. For more details, see the class web site at http://www.sci.utah.edu/~macleod/be6460/	University of Utah
2006–2010	BIOEN 4201 Senior Project I Instructor (one of 4) 35–40 senior undergrad- uate students in the class. Students use data from a senior research project and learn to present the results in the form of a paper, ver- bal presentations, and poster. Also learn how to carry out reviews of scientific papers	Dept. of Bioengineering, University of Utah
2007–2010	BIOEN 4202 Senior Project II Instructor (one of 4) 35–40 senior undergrad- uate students in the class. Students use data from a senior research project and learn to present the results in the form of a paper, ver- bal presentations, and poster. Also learn how to carry out reviews of scientific papers	Dept. of Bioengineering, University of Utah
2001–2005	BIOEN 3202 Physiology II Instructor (40% of lectures), co-developer of this new team taught (2 instructors) under- graduate course. 30 students in the class Course materials available on the WebCT site for the course. University of Utah	Dept. of Bioengineering,

Date	Position	Institution
1993–2001	BIOEN 6010 Principles of Physiology for	Dept. of Bioengineering,
	Bioengineers	
	Instructor (40% of lectures), co-developer,	University of Utah
	and now coordinator of this team	
	taught (originally 2 instructors, now 6-	
	8). 20-30 students in the class. For	
	more details, see the class web site at	
	http://www.sci.utah.edu/~macleod/be6010/	
1981–86	Physics for Medical Students	Institut für Medizinische Physik
	Instructor in team taught laboratory course (8	Universität Graz, Graz, Austria
	instructors). 300 students in the class	

Teaching awards

1994, 1998, 2008, and 2011: rated in top 15% of all School of Engineering courses in Student Evaluation for one or more courses.

New Courses Developed

All the courses listed above were completely new courses at the time I began them, developed either alone or in collaboration with other instructors. Below is a summary of those courses and their goals:

- **Medical Physics:** my role in this course was to help develop a complete set of laboratory exercises for the 600–700 medical students who enter the program at the Karl-Franzens University in Graz, Austria. In the traditional European manner, only the department chair held the formal lectures with the students while the rest of the faculty created and carried out the laboratory exercises and engaged in more informal mentoring of students. After helping develop the course material, I taught and refined them for the next six years.
- **BIOEN 6010:** Principles of Physiology for Bioengineers this course was originally listed as BIOEN 562, one quarter of a year-long course about systems medical physiology. Together with Patrick Tresco, and Ken Horch, and the support of a Whitaker Development Award to the department, we developed a complete systems level physiology course specifically for bioengineering graduate students. Subsequent years saw a reorganization of the course to match the requirements of the semester system, Greg Clark replacing Ken Horch for three years, and then the additional assistance from members of the Physiology Department. The course served for two years as a requirement for the Neurosciences Program and is now the core Physiology course required for both Bioengineering and Physiology from the perspective of a quantitative scientist and engineer. The course therefore consists not only of traditional presentations of material from physiology but also the development of simulation and modeling approaches to physiology. The students perform their own simulations of, for example, the electrical activity of a cardiac cell or the mechanical distor-

tion of a vessel during pulsatile blood flow. For more details, see the class web site at http://www.sci.utah.edu/~macleod/be6010/

- **BIOEN 3202: Human Physiology II** this is the second half of a new undergraduate level physiology course series created in collaboration with Greg Clark and Russell Stewart for the new undergraduate Bioengineering program at the University of Utah. Our goals with this course are to capture for the students the essence of a functional approach to physiology, to present physiology as living systems solving engineering problems in order to cope and prosper. I will teach in the spring semester of this course, which we are now offering for the first time. The class web site was within the WebCT system and thus not available for general access.
- **BIOEN/Physiol 6003: Cellular Electrophysiology and Biophysics** this is an advanced graduate level course in cellular electrophysiology and biophysics, also offered for the first time this fall semester of 2008. Developed together with John Bridge, Mike Sanguinetti, Frank Sachse, Steve Poelzing, and Alonso Moreno, this course seeks to build on the basic material in the core physiology course (BIOEN 6000 and 6010) and develop a deeper understanding of electrophysiology and membrane and cellular levels. We are using a mixture of lectures, lab exercise, and homework assignments to expose students to a wide range of measurement methods, mechanisms, and numerical simulation methods. The class web site is http://www.sci.utah.edu/~macleod/be6003.
- **BIOEN/Physiol 6460: Electrophysiology and Bioelectricity** this is an advanced graduate level course in electrophysiology and bioelectricity, also offered for the first time this fall semester of 2001. Developed together with John Bridge, Mike Sanguinetti, and Eric Sobie, this course seeks to build on the basic material in the core physiology course (BIOEN 6000 and 6010) and develop a deeper understanding of bioelectricity. We are using a mixture of lectures, lab exercise, and homework assignments to expose students to a wide range of space and time scales in order to explain how electrical signals one can measure on the body surface ordinate in the flow of nanoscale currents through the membranes of excitable cells. The class web site was http://www.sci.utah.edu/~macleod/be6460.
- **BIOEN/Physiol 6000: System Physiology I** Cardiovascular, respiratory, and renal systems. This is a core graduate Bioengineering course first offered in the Spring 2002 semester. The material derives from the previous BIOEN 6010 course but with a new focus and elevated level. The goal of this course is to understand the concepts and mechanisms of systemic cardiovascular physiology based on a survey of a variety of animal systems. The course assumes a basic knowledge of human physiology and builds on that knowledge by examining the adaptation of other species to meet their challenges and maintain homeostasis. There is substantial emphasis on engineering approaches, quantitative methods, and simulation. The web site or the course is http://www.sci.utah.edu/~macleod/be6000/.
- **BIOEN 7070: Presentations I** This is a complete revision of an existing class to expand content and revamp the approach used to teach graduate students presentation, writing, and specifically grant proposal skills. The class builds on basic skills for both written and oral presentation skills and then refines them for the specific application to a research proposal. This is

a required class for all graduate students in the program. The class is based on multiple revisions and frequent feedback, video recording and analysis of presentations, and peer review with the goal of developing the broadest possible skills in communication of scientific ideas.

- BIOEN 7071: Presentations II This is a continuation of BIOEN 6060.
- **BIOEN/Anesthes. 6110: Biomedical Technology in Anesthesia and Critical Care** This is a completely novel and to our knowledge unique offering, made possible through a collaboration with the Department of Anesthesiology with the goal of exposing graduate students and senior (typically pre-medical) undergraduates to the principles and practice of instrumentation and technology in clinical medicine. This is a team taught course developed together with a clinical attending physician in Anesthesiology that includes lectures on topics such as anesthesia, respiratory monitoring, cardiovascular monitoring, state of consciousness, and the current state of monitoring equipment in both the modern and developing worlds. The course also includes multiple sessions in the operating room and critical care units in which students pair with individual clinical mentors for direct exposure to the clinical settings.
- **BIOEN 4702: Introduction to Image Based Modeling** Goals for the undergraduate course include 1) Introduce students to the basic practice of handling, manipulating, visualizing, and analyzing images from biomedical sources; 2) Prepare students to participate in image based research projects by training them in the use of contemporary software tools; and 3) Expose students to research opportunities in the broad domain of biomedical imaging. The course emphasizes self-guided and peer-assisted, hands-on practical time with the software and data examples. Formal lectures (1 per week) provide introduction to the core ideas and the software. Finally, a series of guest lectures from scientists from the University provides informative examples of the use of imaging and image based modeling and analysis in biomedical research.

Mentored Undergraduate Research Students

Name Date **Current Activity** Azadeh Poursaid Medical School, University of Utah 2004-2006 Jason Woodbury 2005-2006 Unknown Jared Christensen 2006-2007 Unknown Brett Burton 2006-2008 PhD Student, University of Utah 2007-2009 PhD Student, University of Utah Jess Tate Jesse Merkley 2007-2009 M.S. Student, University of Utah Swati Rao 2007-2010 Medical School, University of Utah Eric Fish 2007-2008 Undergraduate Student, University of Utah Medical School, Loyola University Shawn Tate 2008-2010 Tyler Marler 2009-2012 Medical School Engineer with Abbott Medical Christopher Gloschat 2008-2011 Arash Poursaid Clompleted BS/MSDegree 2009-2018 Greg Gardner M.S. in BME, then Medicine 2009-2011 Joel Pieper Medical School 2010-2012 Spencer Thurman 2010-2011 Unknown Abby Reyes 2010-2012 Unknown Myron Lance 2011-2013 Medical School Vince (Vargha) Payandeh 2011-2012 Unknown Abby Reyes 2010-2012 Unknown Douglas Handley 2010-2011 Medical School Jackson Murphy 2011-2013 Medical School Jason Jenson 2011-2013 Medical School Wes Albright 2011-2013 Applying for Medical School Derek Chang 2011-2013 Applying for Medical School Medical School Hannah Treadway 2012-2014 Joshua Schwermer 2011-2013 Entrepreneur Andrew Miller 2012-2015 Graduated In Bioengineering PhD program (U of U) Kara Ann Johnson 2013-2016 Admitted to MD/PhD program 2015 Brian Zenger 2012-2015 Spencer Frisby 2013-2015 Unknown Minna Wang 2014-2016 Graduated Karli Gilette 2013-2015 PhD Program, Graz, Austria Derek Hu 2013-2014 Applying to medical school Alex Gerber 2013-2017 Industry Brianna Kindall 2014-2015 On mission Sam Massey 2016-2018 Unknown Anterpreet Kaur 2016-2017 Intern at Bard Devan Anderson 2017-1018 **Intern In Progress** Lindsay Rupp 2017-2018 PhD Student (with me) Maura Perez Applying to Medicine 2017-2019 Nathan Vance **Completing BS Degree** 2019-2021

Undergraduate Students

Undergraduate Students (continued)

Name	Date	Current Activity
Josh Larsen	2020-2020	Completing BS
Andie Sieja	2019-2022	Completed BS
Ben Orkild	2019-2022	In Progress with UROP support, now in PhD
Anna Busatto	2020-2021	Completing BS and joining PhD program
		with UROP support
Olivia Walker	2020-2023	Graduated BS
Lyndsey Schultz	2021-2022	Completing BS
Derek Lewis	2021-2022	Completed project
Tanner Frahm	2021-2024	Entering medical school
Ben Orkild	2019-2021	Now in PhD Program
Aksel Anderson	2022-	In progress, applying to medical school
Rui Jin	2022-	In progress, moving to BS/MS program
Lauren Anderson	2022-	Graduating 2024, employed at BD Medical
Betül Oğuz	2023-	In progress
Conner Browning	2023-	In progress
Landon Deroche	2023-	In progress
Leila DeCampos	2023-	In progress

Graduate Students: Main Advisor

Current Students

Biomedical Engineering Department Students

Name	Level	Date	Thesis Title	Status
1) Lindsay Rupp	PhD	2020-	Uncertainty Quantification in	In progress
			ECG Imaging	
2) Anna Busatto	PhD	2021-	Arrhythmias in Myocardial Is-	In progress.
			chemia	
3) Eric Paccione (co-advisor)	PhD	2022-	Cardiac Electrophysiology	In Progress
4) Ben Orkild (co-advisor)	PhD	2022-	Cardiac Electrophysiology	In Progress

Past Students: Main/Co-Advisor

1) Prasad Gharpure Ph.D. 1991–96 A Cellular Automaton NVidia Model of Electrical Model of Electrical Wave Propagation in Cardiac Muscle 2) Ruth Klepfer Ph.D. 1992–1998 Effects of Tissue Medtronic, Inc., Minneapolis Problems Problems Number of the second s
2) Ruth Klepfer Ph.D. 1992–1998 Effects of Tissue Medtronic, Inc., Min- Conductivity on neapolis Forward and Inverse Problems
2) Ruth Klepfer Ph.D. 1992–1998 Effects of Tissue Medtronic, Inc., Min- Conductivity on neapolis Forward and Inverse Problems
2) Ruth Klepfer Ph.D. 1992–1998 Effects of Tissue Medtronic, Inc., Min- Conductivity on neapolis Forward and Inverse Problems
2) Ruth Riepfer Ph.D. 1992–1998 Effects of Hissue Meditolic, Inc., Min- Conductivity on neapolis Forward and Inverse Problems
Forward and Inverse Problems
Problems
3) Quan Ni Ph.D. 1995–2000 Interpolation in Three- Inspire Medical Sys-
Dimensional Cardiac tems
Fields
4) Richard Kuenzler M.Sc. 1996–98 Estimation of Epicar- Boston Scientific
dial Potentials from
tialactroda Cathatar
Measurements
5) Laura Travnor M.Sc. 1999–2002 Medical image distor- Jomed. Sacramento.
tion correction CA
6) Bulent Yilmaz Ph.D. 2000–2004 Estimation of epicar- Vice Rector for Edu-
dial activation cation, Abdullah Gül
University, Turkey
7) Bruce Hopenfeld Ph.D. 2000–2004 Simulation of cardiac Angel Medical Sys-
8) Andrew Shafer M Sc 2002 2003 Geometric error in Industry
bioelectric forward
problems
9) Lucas Lorenzo M.Sc. 2002–2004 Multimodal cardiac Hemisur, Santiago,
imaging Chile
10) Zoar Englemann M.Sc. 2002–2006 Drug induced repolar- Coridea, Inc.
ization abnormalities
11) Shibaji Shome Ph.D. 2000–2007 Electrocardiography Acutus Medical
of Hiyocardiai Is-
12) Seok Lew Ph.D. 2004–2008 Inverse source local- Assoc. Prof Olivet
ization in the brain University
13) Lindsey Healy Ph.D. 2006–2009 Cardiac MRI Left program
14) Darrell Swenson Ph.D. 2007–2012 Simulation of myocar- Medtronic
dial ischemia
15) Greg Gardner M.S. 2011–2013 Image analysis for Medical Residency

Biomedical Engineering Department Students: Past

Biomedical Engineering Department Students: Past							
Name	Level	Date	Thesis Title	Current Status			
16) Mette Lindegaard	MS	2013-2014	Image registration for	Novo Nordisk A/S,			
			guidance in atrial abla-	Copenhagen, Den-			
			tion	mark			
17) Josh Blauer	Ph.D.	2007-2015	Atrial fibrillation	Medtronic			
18) Kedar Aras	Ph.D.	2007-2015	Myocardial Ischemia	Professor at U Buffalo			
19) Karli Gillette	MS	2015-2016	Geometric modeling	In PhD program in			
			and simulation of	Graz, Austria			
			cardiac bioelectric				
			fields.				
20) Ayla Khan	M.S.	2012-2017	Shape analysis of car-	ARUP			
			diac structure				
21) Brett Burton	Ph.D.	2008-2018	Simulation of myocar-	Consultant			
			dial ischemia				
22) Jess Tate	Ph.D.	2009–2017	Simulation of defibril-	Technical Manager,			
			lation in patient spe-	SCI Institute			
			cific models				
23) Wilson Good	Ph.D.	2014-2020	Signal analysis in my-	Massimo Medical			
			ocardial ischemia				
24) Brian Zenger	MD/PhD	2017-2021	Acute ischemia and	Medical Residency			
			ECG Imaging	program, WUSTL			
25) Jake Bergquist	PhD	2018-2023	ECG Imaging and	Post doc, UofU			
			Simulation				

Grad Students As Committee Member

Current Students

Name	Level	Date	Thesis Title	Status			
1) Santosh Balakrishnan	Ph.D.	2005-		In Progress			
2) Srinath Lingutla	Ph.D.	2005-		In Progress			
3) Cameron Jacobson	Ph.D.	2008-		In Progress			
4) Annie White	PhD	2017-	His bundle mapping	In Progress			
5) Lars Lofgren	PhD	2019-	kidney function during	In Progress			
			surgery				
6) Jiawei Dong	PhD	2019-	Atrial Fibrillation	In Progress			
7) Eugene Kwan	PhD	2018-	Atrial fibrillation	In Progress			
8) Bram Hunt	PhD	2019-	Atrial fibrillation	In Progress			
9) Caleb Berggren	PhD	2020-	Computation fluid mechanics	In Progress			
10) Samer Merchant	PhD	2020-	MRI DW Imaging	In Progress			
11) Yifan "Jack" Wang	PhD	2020-	Computation fluid mechanics	In Progress			
12) David Jiang	PhD	2021-	Computation fluid mechanics	In Progress			
13) Andrea Corbin	MS	2021-	Cardiac Electrophysiology	In Progress			
14) Qi Huang	PhD	2021-	Cardiac MRI	In Progress			
15) Jade Bookwalter	PhD	2022-	Cardiac Metabolism	In Progress			
16) Vu Nguyen	PhD	2022-	Cardiac Heart Failure	In Progress			
17) Trey Blackwell	PhD	2022-	Anesthesiology	In Progress			
18) Sofia Ruiz	PhD	2022-	Heart Failure	In Progress			
19) Emmanuel Offei	PhD	2022-	Cardiac Heart Failure	In Progress			
20) Tamanna Islam	PhD	2024-	Pulmomnary Hypertension	In Progress			
21) Seth Kussow	PhD	2023-	Orthopedic Simulation	In Progress			
22) Madelyn Stout	PhD	2023-	Orthopedic Shoulder Mechan-	In Progress			
			ics				
23) Laurence Saint-Pierre	PhD	2023-	Blood Loss and Shock	In Progress			
24) Laurence Saint-Pierre	PhD	2023-	Blood Loss and Shock In Progress				

Biomedical Engineering Department Students: Current

Other Department Students: Current							
Name	Level	Department	Date	Thesis Title	Current Status		
1) Dennis Njeru	PhD	2020-2023	Visualization of Uncertainty	Moved to MS Pro-			
				gram			
2) Henry Crandall	PhD	2022-	Bioelectric Impedance	In Progress			

Past Students

Biomed	ical E	Inginee	ring De	partment	Stud	ents:	Past
					~ • • • •		

Diometrical Engineern	ng Depa	i ment Stude		
Name	Level	Date	Thesis Title	Current Status
1) Anton Bowden	Ph.D.	1998–2003	Image registration	Professor at Brigham
			tools	Young Univ.
2) Harshali Khare	Ph.D.	1999–2004	Quantitation with low	
			count dynamic cardiac	
			SPECT	
3) Richard Shelton	M.Sc.	2000-2003		
4) Girish Bal	Ph.D.	2000-2003		Post Doctoral Fellow,
				Penn State University
5) Yinqi Zheng	Ph.D.	2000-2004	Integrated information	Private industry
			display for anesthesia	·
			monitoring	
6) Christopher Butson	Ph.D.	2000-2003	C	Assoc. Prof. Medical
				College of Wisconsin
7) Rachane Visaria	Ph.D.	1999–2004	Cardiovascular pul-	Post Doctoral Fellow-
			monary mechanics	ship
			and gas exchange	-
			modeling	
8) Dosik Hwang	Ph.D.	2002-2005	Iterative Reconstruc-	Post Doctoral Fellow-
			tion for SPECT emis-	ship
			sion and transmission	-
			measurements	
9) GyuTae Kim	M.E.	2002-2005	Filtering Signals &	Unknown
· •			Detecting Peak Values	
			in QRS Complex	
10) Ken Olree	Ph.D.	2002-2004	Magnetically Induced	Assist. Prof., Hard-
			Unidirectional Action	ing University, Searcy,
			Potentials	AR
11) Michelle Dalton	M.Sc.	2003-2004	Mechanics of the Me-	Alta View Hospital
			dial Collateral Liga-	1
			ment in Normal and	
			ACL deficient Knee	

Nama		Doto	Thesis Title	Current Status
12) Prod Stalson		2004 2005	Morphological Do	
12) Diau Stokel	WI.S.	2004-2003	rameters of Cervical	Law School
			Carotid Imaging with	
			MR	
13) Alex Brownell	M.S.	2005-2006	Turn Counting as a	Medical School
			Clinical Alternative to	
			Fiber Density Studies	
			in Quantitative Elec-	
			tromyography	
14) PJ Hawkes	M.S.	2005–2006	Micro CT Imaging of	Medical School
	МС	2005 2006	Transgenic Mice	
15) Ben Randell	M.S.	2005-2006	Characterizing Respi-	Medical School
			Airway Obstruction	
			for Remifentanil and	
			Propofol Combina-	
			tions	
16) Michael Sherman	M.S.	2005-2006	Non-Invasive Mea-	Medical School
,			surement of Func-	
			tional Residual	
			Capacity by CO_2	
			Rebreathing and N_2	
			Washout	
17) David Sutherland	M.S.	2006–2007	Quantifying Ventricu-	Medical School, Uni-
			lar Activation Timing	versity of Utah
19) Condoon Choudom		2002 2006	and Synchrony	Dest Destard Fallow
(18) Sandeep Choudary	PII.D.	2003-2000	toring Anesthetic Ef	ship
			fect	siip
19) Philip Blood	Ph D	2002-2007	Simulation of molecu-	Unknown
1))1p.2100#	1 112 1	2002 2007	lar dynamics	
20) Olinto Linares	Ph.D.	2003-2007	Signal processing of	Post Doctoral Fellow,
			EEG signals	University of Utah
21) James Pinkston	M.S.	2006-2007		Industry
22) Karah Morley	M.S.	2006-2007		Unknown
23) In Suk Joung	Ph.D.	2007-2009		Postdoctoral fellow-
		0005 0000		ship
24) Nate Pack	Ph.D.	2005-2008	Cardiac MRI	Unknown
25) Kwanghyun Sohn	Ph.D.	2006–2010	Cardiac mapping	PDF at MGH, Boston

Biomedical Engineering Department Students: Past (continued)

Rob S.	MacLeod
--------	---------

Biomedical Engineering Department Students: Past (continued)							
Name	Level	Date	Thesis Title	Current Status			
26) Matthias Görges	Ph.D.	2007–2010	Signal processing, hu- man factors, and mod- eling to support inten- sive care unit bedside	University of British Columbia			
			care				
27) Katie Brenneman	Ph.D.	2008–2009		Howard Hughes Med- ical Institute			
28) Jacob Fluckinger	Ph.D.	2007–2010	Cardiac MRI	PDF at Vanderbilt University			
29) Tammy Anderson	M.S.	2008-2010	Unknown				
30) Alex Brownell	Ph.D.	2009-2010	Neuroprosthetics	Industry			
31) Brad Isaacson	Ph.D.	2007-2010	Osseointegration	Boston Scientific			
32) Jay Christopherson	M.S.	2008-2010	C				
33) Rengasayee Veeraraghavan	Ph.D.	2005–2011	Heterogeneity in car- diac cellular electro- physiology	Postdoc at University of Utah			
34) Cris Lapierre	Ph.D.	2006-2012	Dosing strategies for	Postdoc at MGH,			
· -			multi-anesthetics	Boston			
35) Lara Brewer	Ph.D.	2006–2011		Res. Assist. Professor of Anesthesiology,			
	140	2010 2011	a	University of Utah			
36) Christina Long	M.S.	2010–2011	Capnogram waveform simulator	Industry			
37) Brett Dowden	Ph.D.	2006–2011	Recording and decod- ing neural signals	Industry			
38) Amara Greer-Short	PhD	2011–2012	Effect of diabetes on calcium handling in the heart	Moved with advisor to new institution			
39) Sharon George	PhD	2011–2012	Cytokine Inflamma- tion on the Conduction Velocity in the heart	Moved with advisor to new institution			
40) Neda Sadegh	Ph.D.	2008-2103	Image processing	Post Doc			
41) Yanfei Mao	Ph.D.	2011-2014	Medical Image Acqui- sition and SPECT				
42) Paul Moore	M.S.	2011–2013	Course only MS de- gree	Industry			
43) Joseph Hinkle	PhD	2010–2014	The Study of Shape Change in Organ Mo- tion and Shape Re- gression				
44) Josh Silvernagel	M.Sc.	2011–2014	Simulation of atrial fibrillation	Industry (Biosence- Webster)			
45) Paul Venable	PhD	2011–2014	Ventricular fibrillation	Industry (Physio Con- trol)			

Biomedical Engineering Depa	artment	Students: Pa	ast (continued)	
Name	Level	Date	Thesis Title	Current Status
46) Anh Pham	MS	2017–2018	Detecting post- operative airway obstruction using pulse oximeter wave- form patterns and frequency.	Industry
47) Yanfei Mao	PhD	2011–2014	SPECT imaging	Postdoctoral fellow- ship
48) Tyson Taylor	PhD	2011-	Role of ischemia in ventricular fibrillation	Industry (Blackrock)
49) Bradley Zentgraf	MS	2012-	Course only MS de- gree	Industry
50) Andrew Willsie	PhD	2012–2015	Deep Brain Stimula- tion	Industry
51) Preethi Sankaranarayanan	PhD	2011–2014	Matrix and Tensor Comparisons of Genomic Profiles	
52) Avantika Vardhan 53) Chris Welsh	Ph.D. PhD	2010–2015 2011–2015	Image Processing Compressed Sensing reconstruction of MR DTI	
54) Nathan Angel	PhD	2012–2016	Role of Purkinje sys- tem in ventricular fib- rillation	Accutis Medical
55) Osamma Abdulah56) Justin Lichter	PhD PhD	2012–2016 2012–2015	DTI Imaging Confocal microscopy for cardiac electro- physiology	Postdoctoral fellow Postdoctoral fellow
57) Caleb Rottman58) Carl Tams	PhD Ph.D.	2013–2016 2007–2015	Image reconstruction Modeling of Respira- tion and Blood Pres- sure	
59) Kyungpyo Hong60) Katie Aiello	PhD PhD	2015– 2016–2017	MRI Imaging Comparative matrix modeling of genomic data	Industry Genentech
61) Chris Conlin	MS	2015–2018	MRI of kidneys	Lab Manager, U of Utah
62) Cody Maughan	MS	2017-2018	Genetic signal pro- cessing	Unknown
63) Michael Fogarty	PhD	2012–2017	Electric Blower Based Portable Emergency Ventilator	CTO, AccuBreath

Biomedical Engineerin	g Departme	nt Students:	Past (continued)	
Name	Level	Date	Thesis Title	Current Status
64) Spencer Madsen	PhD	2012-2017	Respiration Measure-	Completed with MS,
			ment	CEO at AccuBreath
65) Jessie France	No degree	2013–2016	Uncertainty in Inverse Problems	Industry
66) Katie Sciuto	PhD	2013–2018	Metabolic disorders in cardiac ischemia	Unknown
67) Sean Ermer	PhD	2013–2020	Portable ventilation in anesthesia	Unknown
68) Rinchen Phuntsok	PhD	2016–2019	Pediatric biomechan- ics	Research Consultant K2M
69) Kyle Burke	PhD	2015–2019	Biomedical device de- velopment	Dynasthetics LLC
70) Elyar Ghafoori	PhD	2015–2019	Cardiac mapping an atrial fibrillation	Acutus Medical
71) Lindsay Schuring	MS	2018-2019	Hip joint kinematics	Unknown
72) Dan Pike	Ph D	2010-2019	Blood flow in dialysis	Unknown
(2) Dui Tike	1 11.12.	2010 2017	AV graft stenosis	Chikitown
73) Andrew Janson	PhD	2016–2019	Deep Brain Stimula- tion	Postdoctoral Fellow, Vanderbilt U.
74) Jordan Johnson	MS	2017–2019	Optical sensing of car- diac conduction sys- tem	Medical School
75) Kyle Jeong	PhD	2018-2020	MRI Imaging Meth- ods	Unknown
76) Isabelle Falzon	MS	2019-2020	AV Fistula modeling	Industry
77) Kara Johnson	PhD	2017-2020	DBS Neuromodula-	Postdoctoral at Florida
		_017 _020	tion	University
78) Nate Knighton	PhD	2017–2020	multi-integrated con- focal imaging probes	Industry
79) Roya Kamali	PhD	2017–2020	Simulation of atrial	Postdoctoral fellow- ship Baylor Med
80) Shana Black	PhD	2017–2021	DBS Neuromodula-	Unknown
81) Azmi Ahmad	PhD	2017–2021	Role of TRPC1 and TRPC6 Channels in cardiac function	In Progress
82) Patrick Kolbay	PhD	2016–2021	Ventilation device for	Postdoctoral Fellow
83) Lorne Hoffstetter	MD/PhD	2017–2021	MR-guided focused	MD/PhD in progress
84) Jason C. Huang	MS	2018-2020	Antidepressant ther-	Unknown
85) Chantel Charlebois	PhD	2017-2022	Simulation of neuro- modulation	Pursing Industry Ca- reer

Biomedical Engineering Department Students: Past (continued)

Biomedical Engineering Department Students: Past (continued)						
Name	Level	Date	Thesis Title	Current Status		
86) Bradley Stringer	PhD	2016-2021	Spectroscopy of the	Industry		
			Superior Vena Cava			
			and Right Atrium			
87) Elliott Hurd	PhD	2017-2022	Coronary blood flow	Unknown		
88) Molly Streiff	PhD	2017-2021	Myocardial cell struc-	Industry		
			ture			
89) Thirupura (Anu) Shankar	PhD	2017-2022	Heart failure	AHA Postdoctoral		
-				Fellow		
90) Sam Colby	MS	2018-2020	Diffusion tensor imag-	Unknown		
			ing			
91) Aparna Chakkalakkal	PhD	2018-2021	Modeling of cardiac	Industry		
-			conductivity	-		
92) Ankur Shah	PhD	2018-2020	Ventricular arrhyth-	Industry		
			mias	-		
92) Michael Allee	MS	2022-2023	Tensor Decomposition	Industry		
			of Lifespan Data	-		
93) Britney Chen	MS	2022-2023	Kidney Failure	Epic Inc. (Industry)		
94) Brett Mecham	MS	2022-2023	Prosthetic Control	Unknown		
92) Ankur Shah92) Michael Allee93) Britney Chen94) Brett Mecham	PhD MS MS MS	2018–2020 2022-2023 2022-2023 2022-2023	Ventricular arrhyth- mias Tensor Decomposition of Lifespan Data Kidney Failure Prosthetic Control	Industry Industry Epic Inc. (Industry) Unknown		

Biomedical Engineering Department Students: Past (continued)

School of Computing Students: Past				
Name	Level	Date	Thesis Title	Current Status
1) Yarden Livnat	Ph.D.	1994–98	Distributed Graphics Pipelines in Scientific Visualization (Comp. Sci.)	U of Utah, SCI Insti- tute
3) Carol Gitlin	M.Sc.	1993–95	Techniques for Visualizing 3D Unstructured Meshes (Comp. Sci.)	Autometric Inc.
4) James Purciful	M.Sc.	1994–96	Three-Dimensional Widgets for Scientific Visualization and Animation (Comp. Sci.)	Engineering Anima- tion Inc.
5) Feng Yu	M.Sc.	1994–95	An Automatic Adaptive Refinement and Derefinement Method (Comp. Sci.)	EDS/Unigraphics
6) Dean Brederson	M.S.	1995–2005	Haptic Control of Remote Medical Surgery (Comp. Sci.)	unknown
7) Rob van Uitert	Ph.D.	1999–2004	(Comp. Sci.)	NIH staff scientists
8) Milan Itkis	Ph.D.	2000–2006	Virtual Reality and Haptics	Software industry
9) Kris Zyp	M.Sc	2000-2003	-	
10) David Weinstein	Ph.D.	1994–2003	Inverse Solutions in Electroencalography (Comp. Sci.)	Numira Bioscience.
11) Sarah Geneser	Ph.D.	2004–2007	Statistical simulation of bioelectric fields	Post doc at Stanford University
12) Dafang Wang	Ph.D.	2006–2012		Inverse Problems in Electrocardiography
13) Zhisong Fu	Ph.D.	2011–2013	GPU implementation of PDE solutions	Industry
14) Gopal Veni	Ph.D.	2013–2016	Automated segmenta- tion of cardiac MRI	Industry
15) Ally Warner	MS	2014–2018	Heading modeling for EEG	SCI Institute

Other Departments: Past						
Name	Level	Department	Date	Thesis Title	Current Status	
1) Quinn Tate	PhD	Electrical Eng.	2011-2012	Monitoring cardio-	Abandoned PhD	
				vascular change.	for Medical School	
2) Pejman Saberin	MS	CES	2012–14	Simulation of fluid distribution in pa- tients during anes- thesia	Industry	

External Examiner

Name	Level	Date	Thesis Title	University
1) David Davenport	M.Sc.	1994–95	Temporal, Spatial, and	Northeastern Univer-
			Frequency Constraints	sity
			on Heart Surface Po-	
\mathbf{O} \mathbf{D} 1 \mathbf{C} 1 4	MG	1006 1007	tential Distributions	
2) Rick Gaudette	M.Sc.	1996–1997	Spatio-temporal	Northeastern Univer-
			Potentials	Sity
3) Hanson On	M.Sc.	1992–95	Multiresolution Body	Northeastern Univer-
			Surface Potentials	sity
			Array ECG Signal	
			Analysis of PTCA	
		1000	Induced Ischemia	NT 1 1 TT 1
4) Ghandi Ahmad	Ph.D.	1992–96	Inverse	Northeastern Univer-
			Electrocardiography	sity
			Iterative Imposition of	
			Multiple Constraints	
5) Leo Cheng	Ph.D.	2001	Noninvasive electrical	University of Auck-
c) 200 chiếng	1 1112 (2001	imaging of the heart	land, New Zealand
6) Yesim Serinagaoglu	Ph.D.	1999–2003	Statistical approaches	Northeastern Univer-
			to cardiac inverse	sity
			problems	
7) Alireza Ghodrati	Ph.D.	2001-2005	Lead selection and	Northeastern Univer-
			wavefront-based	sity
			models for the in-	
			verse problem of	
8) Oin I i	Ph D	2005	electrocardiography	University of Tasma-
	1 11.12.	2005		nia
9) Matti Stenroos	Ph.D.	2008	Boundary Element	Helsinki University of
			Method in Spatial	Technology
			Characterization of	
		2000	the Electrocardiogram	
10) Chanchai Thaijiam	Pn.D.	2008	Using Electromag-	University of Tasma-
			Numerical Methods	IIIa
			to Develop Improved	
			Conductance Catheter	
			Volume Measurement	
11) Juho Väisänen	Ph.D.	2010	Electrode sensitivity	Tampere University of
			-	Technology
12) Machteld Boonstra	Ph.D.	2023	Non-invasive Inverse	Utrecht University
			ECG Techniques in	
			28° ardiomyopathy	

Rob S. MacLeod

Name	Level	Date	Thesis Title	University
12) Levi Bassin	Ph.D.	2013	Mechanisms of Cold	University of Sydney,
			on Heart Electrophys-	Australia
			iology	
13) Jingjia Xu	PhD	2016	Bayesian Inference	Rochester Institute of
			with Combined Dy-	Technology
			namic and Sparsity	
			Models: Application	
			in 3D Electrophysio-	
			logical Imaging	
14) Matthjis Cluitmans	Ph.D.	2016	Electrocardiographic	Maastricht University,
			Imaging	The Netherlands

Postdoctoral Fellows

Name	Date	Field of activity	Current Status
Rok Hren	1997–99	Simulation of cardiac electro-	Head of Laboratory Diagnos-
		physiology, geometric model-	tics, Adriatic Region, Siemens
		ing	Medical.
Stefan Gumhold	2000-01	Geometric modeling and	Prof., Univ. of Tuebingen
		mesh generation research	
Xinlong Wang	2000-02	Geometric modeling and	Industry
		mesh generation research	
Jeroen Stinstra	2002-07	Multimodal cardiac imaging	NVIDIA
Carsten Wolters	2004–05	Neuroelectric source localiza-	Associate Prof. University of
		tion	Muenster
Xavier Tricoche	2004–07	Vector field visualization and	Associate Prof. Purdue Univ.
		topology	
Jens Krueger	2008-09	Volume visualization	Professor, U of Duisburg,
			Germany
Mike Steffen	2009–2010	Simulation of Bioelectric	Boeing
		fields	
Josh Cates	2010-2012	Image analysis	Kitware
Moritz Dannhauer	2011-2017	Simulation and Mathematical	Duke University
		Modeling of Bioelectric fields	
Darrell Swenson	2012-2013	Image Based Support for	Medtronic Inc.
		Clinical Ablation Procedures.	
Jess Tate	2019–2023	Image Based Modeling	In progress
Matthias Lange	2021-2023	Cardiac EP Modeling	Industry
Jake Bergquist	2023-	Cardiac Modeling and Ma-	Co-supervised
		chine Learning	

Medical Students

Name	Date	University	Project
Rob Oakes	2007–2008	University of Utah	Quantification of MRI based fibrosis in AF patients.
Brett Walker	2010-2011	University of Utah	Shape statistical analysis of left atrial shape.
Quinn Tate	2013	University of Utah	Development of blood loss monitoring system for the OR.
James Brundage	2021-2023	University of Utah	Machine Learning with ECG signals.

Peer-reviewed Journals

- 1. M. C. Colman, M. Varela, R.S. MacLeod, J.C. Hancox, and O.V. Aslanidi. Interactions between calcium-induced arrhythmia triggers and the electrophysiological-anatomical substrate underlying the induction of atrial fibrillation. *J. Physiol.*, 2024.
- L.R. Bear, J.A. Bergquist, E. Abell, H. Cochet, R.S. MacLeod, R. Dubois, and Y. Serinagaoglu. Investigation into the importance of using natural PVCs and pathological models for potential-based ECGI validation. *Front. Physiol.* 14:1198001, 2023.
- 3. J.A. Bergquist, B. Zenger, J. Brundage, R.S. MacLeod, T.J. Bunch, R. Shah, X. Ye, A. Lyons, R. Ranjan, T. Tasdizen, and B.A. Steinberg", Performance of Off-the-Shelf Machine Learning Architectures and Biases in Detection of Low Left Ventricular Ejection Fraction., *medRxiv*, 2023.
- 4. J.A. Bergquist, B. Zenger, L.C. Rupp, A. Busatto, J. Tate, D.H. Brooks, A. Narayan and R.S. MacLeod. Uncertainty quantification of the effect of cardiac position variability in the inverse problem of electrocardiographic imaging. *Physiol Meas*, 44:10, 2023.
- B. Zenger, J.A. Bergquist, A. Busatto, WW Good, LC Rupp, V. Sharma, and R.S. MacLeod. Tipping the scales of understanding: An engineering approach to design and implement whole-body cardiac electrophysiology experimental models. *Front. Physiol.* 14:1100471, 2023.
- R. Kamali, E. Kwan, M. Regouski, T.J. Bunch. D.J. Dosdall, E. Hsu, R.S. MacLeod, I. Polejaeva and R. Ranjan. Contribution of atrial myofiber architecture to atrial fibrillation. *PloS One* 18:1:e0279974, 2023.
- R. Kamali, K. Gillete, J. Tate, D.A. Abhyankar, D.J. Dosdall, G. Plank, T.J. Bunch, R.S. Macleod, and R. Ranjan. Treatment Planning for Atrial Fibrillation Using Patient-Specific Models Showing the Importance of Fibrillatory-Areas. *Annals BME* 51(2):329-342, 2023.
- 8. J. Tate, Z. Liu, J.A. Bergquist, S. Rampersad, D. White, C. Charlebois, L. Rupp, D.H. Brooks, R.S. MacLeod, and A Narayan. UncertainSCI: A Python Package for Noninvasive Parametric Uncertainty Quantification of Simulation Pipelines. *J Open Source Software*, 2023.
- A. Narayan, Z. Liu, J.A. Bergquist, C. Charlebois, S. Rampersad, L.C. Rupp, D.H. Brooks, D. White, J.D. Tate, and R.S.MacLeod. UncertainSCI: Uncertainty quantification for computational models in biomedicine and bioengineering. *Comp. Biol. & Med.* 152:106407, 2022.
- X. Jiang, M. Toloubidokhti, J.A. Bergquist, B. Zenger, W.W. Good, R.S. MacLeod, and L. Wang. Improving Generalization by Learning Geometry-Dependent and Physics-Based Reconstruction of Image Sequences. *IEEE Trans. Med. Imag.* 42:2:403–415, 2023.

- M. Lange, E. Kwan, D.J. Dosdall, R.S. MacLeod, T.J. Bunch, and R. Ranjan. Case report: Personalized computational model guided ablation for left atrial flutter. *Front. Cardiovasc. Med.* 9:893752, 2022.
- R. Kamali, K. Gillette, J.D. Tate, D.A. Abhyankar, D.J. Dosdall, G. Plank, T.J. Bunch, R.S. MacLeod, and R. Ranjan. Treatment Planning for Atrial Fibrillation Using Patient-Specific Models Showing the Importance of Fibrillatory-Areas. *Annals Biomed. Eng.* 51(2):329–342, 2022.
- 13. S. Al-Zaiti, R.S. MacLeod, P Van Dam, S.W. Smith, and Y. Birnbaum. Emerging ECG methods for acute coronary syndrome detection: Recommendations & future opportunities. *J Electrocardiol.* 74:65–72, 2022.
- J.A. Bergquist, J. Coll-Font, B. Zenger, L.C. Rupp, W.W. Good, D.H. Brooks, and R.S. MacLeod. Reconstruction of cardiac position using body surface potentials. *Comput. Biol. and Med.* 142:105174, 2022.
- B.S. Orkild, B. Zenger, K. Iyer, L.C. Rupp, M.M. Ibrahim, A.G. Khashani, M.D. Perez, M.D. Foote, J.A. Bergquist, A.K. Morris, J.J. Kim, B.A. Steinberg, C. Selzman, M.B. Ratcliffe, R.S. MacLeod, S. Elhabian, and A.E. Morgan. All Roads Lead to Rome: Diverse Etiologies of Tricuspid Regurgitation Create a Predictable Constellation of Right Ventricular Shape Changes. *Front. Physiol.* 13:908552, 2022.
- Y. Ishidoya, E. Kwan, D.J. Dosdall, R.S. MacLeod, L. Navaravong, B.A. Steinberg, T.J. Bunch, and R. Ranjan. Shorter Distance Between The Esophagus And The Left Atrium Is Associated With Higher Rates Of Esophageal Thermal Injury After Radiofrequency Ablation. J. Cardiovasc. Electrophysiol. 33(7):1460–1471, 2022.
- 17. Y. Ishidoya, E. Kwan, D.J. Dosdall, R.S. Macleod, L. Navaravong, B.A. Steinberg, J.T, Bunch, and R. Ranjan. Short-term natural course of esophageal thermal injury after ablation for atrial fibrillation. *J Cardiovasc Electrophysiol.* 33(7):1450-1459, 2022.
- S. Schuler, M. Schaufelberger, L.R. Bear, J.A. Bergquist, M.J.M. Cluitmans, J. Coll-Font, O.N. Onak, B. Zenger, A. Loewe, R.S. MacLeod, D.H. Brooks, and O. Dossel. Reducing Line-of-Block Artifacts in Cardiac Activation Maps Estimated Using ECG Imaging: A Comparison of Source Models and Estimation Methods. *IEEE Trans. BME* 69(6): 2041–2052, 2022.
- W.W. Good, B. Zenger, J.A. Bergquist, L.C. Rupp, K. Gillette, N. Angel, D. Chou, G. Plank, and R.S. MacLeod. Combining endocardial mapping and electrocardiographic imaging (ECGI) for improving PVC localization: A feasibility study. *J Electrocardiol.* 698:51-54. 2021.
- 20. W.W. Good, B. Zenger, J.A. Bergquist, L.C. Rupp, K.K. Gillette, M.A.F. Gsell, G. Plank, and R.S. MacLeod. Quantifying the spatiotemporal influence of acute myocardial ischemia on volumetric conduction velocity. *J. Electrocardiol.* 66:86–94, 2021.

- J. Salinet, R. Molero, F.S. Schlindwein, J. Karel, M. Rodrigo, J.L. Rojo-Álvarez, O. Berenfeld, A.M. Climent, B. Zenger, F. Vanheusden, JGS Paredes, R.S. MacLeod, F. Atienza, M.S. Guillem, M. Cluitmans, and P. Bonizzi. Electrocardiographic Imaging for Atrial Fibrillation: A Perspective From Computer Models and Animal Experiments to Clinical Value. *Front Physiol* 12:653013, 2021.
- 22. C.M. Charlebois, D.J. Caldwell, S.M. Rampersad, A.P. Janson, J.G. Ojemann, D.H. Brooks, R.S. MacLeod, C.R. Butson, and A.D. Dorval. Validating Patient-Specific Finite Element Models of Direct Electrocortical Stimulation. *Front Neurosci*. Aug 2;15:691701, 2021.
- 23. J Bergquist, L.C. Rupp, B. Zenger, J. Brundage, A. Busatto, and R.S. MacLeod. Body Surface Potential Mapping: Contemporary Applications and Future Perspectives. *Hearts* 2:514–542, 2021.
- 24. B. Zenger and W.W. Good. J.A. Bergquist, L.C. Rupp, M. Perez, G.J. Stoddard, V. Sharma, and R.S. MacLeod. Pharmacological and simulated exercise cardiac stress tests produce different ischemic signatures in high-resolution experimental mapping studies. *J Electrocardiol.* 68:56–64, 2021.
- B. Zenger and W.W. Good. J.A. Bergquist, L.C. Rupp, M. Perez, G.J. Stoddard, V. Sharma, and R.S. MacLeod. Transient recovery of epicardial and torso ST-segment ischemic signals during cardiac stress tests: A possible physiological mechanism. *J Electrocardiol.*, Nov-Dec;69S:38–44, 2021.
- A.S. Rababah, L.R. Bear, Y. Serinagaoglu-Dogrusoz, W.W. Good, J.A. Bergquist, R.S. Mac-Leod, K. Rjoob, M. Jennings, J. Mclaughlin and D.D. Finlay. The effect of interpolating low amplitude leads on the inverse reconstruction of cardiac electrical activity. *Comput Biol. Med.* Sep;136:104666, 2021.
- W.W. Good, B.W. Zenger, J.A. Bergquist, L.C. Rupp, K.K. Gillette, N. Angel, D. Chou, G. Plank, and R.S. MacLeod. Combining endocardial mapping and electrocardiographic imaging (ECGI) for improving PVC localization: A feasibility study. *J Electrocardiol*. Nov-Dec;69S:51–54, 2021.
- W.W. Good, K.K. Gillette B.W. Zenger, J.A. Bergquist, L.C. Rupp, J.D. Tate, D. Anderson. M. Gsell, G. Plank, and R.S. MacLeod. Estimation and Validation of Cardiac Conduction Velocity and Wavefront Reconstruction Using Epicardial and Volumetric Data. *IEEE Tran. Biomed. Eng.* 68:11:3290–3300, 2021.
- 29. J.A. Bergquist, W.W. Good, B. Zenger, J.D. Tate, L.C. Rupp, and R.S. MacLeod. The electrocardiographic forward problem: A benchmark study. *Comput Biol Med.* Jul;134, 2021.
- 30. R. Kamali, J. Kump, E. Ghafoori, M. Lange, H. Nan, T.J. Bunch, D.J. Dosdall, R.S. Mac-Leod, and R. Ranjan. Area Available for Atrial Fibrillation to Propagate is an Important Determinant of Recurrence after Ablation. *JACC Clin. EP* July:7(7):896–908, 2021.
- L.R. Bear, Y. Serinagaoglu Dogrusoz, W.G. Good, J. Svehlikova, J. Coll-Font, E. van Dam, and R.S. MacLeod. The Impact of Torso Signal Processing on Noninvasive Electrocardiographic Imaging Reconstructions. *IEEE Tran. Biomed. Eng.* 68(2): 436–447, 2021.

- 32. J.A. Bergquist, J. Coll-Font, B. Zenger, L.C. Rupp, W.W. Good, D.H. Brooks, and R.S. Mac-Leod. Simultaneous Multi-Heartbeat ECGI Solution with a Time-Varying Forward Model: a Joint Inverse Formulation. *Funct Imaging Model Heart* Jun:12738:493–502, 2021.
- 33. J.D. Tate, W. Good, N. Zemzemi, M. Boonstra, P. van Dam, D.H. Brooks, A. Narayan, and R.S. MacLeod. Uncertainty Quantification of the Effects of Segmentation Variability in ECGI. *Funct Imaging Model Heart* Jun:12738:515–522, 2021.
- K. Yamashita, R. Kamali, E. Kwan, R.S. MacLeod, D.J. Dosdall, and R. Ranjan. Effective Ablation Settings That Predict Chronic Scar After Left Atrial Ablation. *JACC Clin Electrophysiol.* Feb;6(2):143-152, 2020
- 35. W.G. Good, B. Erem, B. Zenger, J. Coll-Font, J.A. Bergquist, D.H. Brooks, and R.S. Mac-Leod. Characterizing the transient electrocardiographic signature of ischemic stress using Laplacian Eigenmaps for dimensionality reduction. *Comp. in Biol. & Med.*, 127:104059, 2020.
- R. Kamali, J. Schroeder, E. DiBella, B. Steinberg, F. Han, D.J. Dosdall, R.S. Macleod, and R. Ranjan. Reproducibility of clinical late gadolinium enhancement magnetic resonance imaging in detecting left atrial scar after atrial fibrillation ablation. *J Cardiovasc Electrophysiol*. 31(11):2824–2832, Nov. 2020.
- 37. J.D. Tate, T.A. Pilcher, K.K. Aras, B.M. Burton, and R.S. MacLeod. Validating Defibrillation Simulation in a Human-Shaped Phantom. *Heart Rhythm J* 17(4): 661-668, 2020.
- K. Yamashita, E. Kwan, R. Kamali, E. Ghafoori, B.A. Steinberg, R.S. MacLeod, D.J. Dosdall, and R. Ranjan. Blanking period after radiofrequency ablation for atrial fibrillation guided by ablation lesion maturation based on serial MR imaging. *J Cardiovasc. Electrophysiol.* 31(2):450–456, 2020.
- 39. B. Zenger, W.G. Good, J.A. Bergquist, B.M. Burton, J.D. Tate, L. Berkenbile, V. Sharma, and R.S. MacLeod. Novel experimental model for studying the spatiotemporal electrical signature of acute myocardial ischemia: a translational platform. *Physiol Meas.* 41(1):0015002, 2020.
- 40. K. Yamashita, E. Ghafoori, J. Silvernagel, J. Ashton, D. Dosdall, R.S. MacLeod, and R. Ranjan. The Effective Contact Force to Minimize Edema Relative to Chronic Lesion Formation During Radiofrequency Ablation in Ventricular Wall. *Int Heart J.* 60(6):1407-1414, 2019.
- 41. K. Yamashita, J. Silvernagel, E. Kwan, R. Kamali, E. Ghafoori, R.S. MacLeod, D.J. Dosdall, and R. Ranjan. Changes in atrial electrophysiological and structural substrate and their relationship to histology in a long-term chronic canine atrial fibrillation model. *Pacing Clin Electrophysiol.* 42(7):930-936, 2019.
- 42. J.D. Tate, S. Schuler, O. Dössel, R.S. MacLeod, and T.F. Oostendorp. Correcting Undersampled Cardiac Sources in Equivalent Double Layer Forward Simulations. Funct Imaging Model Heart. 11504:147–155, 2019.

- 43. J.A. Bergquist, W.W. Good, B. Zenger, J.D. Tate, and R.S. MacLeod. GRÖMeR: A Pipeline for Geodesic Refinement of Mesh Registration. Funct Imaging Model Heart. 11504:37–45, 2019.
- 44. S. Schuler, J.D. Tate, T.F. Oostendorp, R.S. MacLeod, and O Dössel. Spatial Downsampling of Surface Sources in the Forward Problem of Electrocardiography. In International Conference on *Functional Imaging and Modeling of the Heart* (pp. 29–36). Bordeaux, France. 2019.
- 45. K. Yamashita, E. Kholmovski, E. Ghafoori, R. Kamal, E. Eugene, J. Lichter, R.S. Mac-Leod, D. Dosdall, and R. Ranjan. Characterization of Edema after Cryo and Radiofrequency Ablation based on Serial MR Imaging. *J Cardiovasc. Electrophys.* 30(2), 2019.
- 46. Z. Xiong, V.V. Fedorov, X. Fu, E. Cheng, R.S. MacLeod, J. Zhao. Fully Automatic Left Atrium Segmentation from Late Gadolinium Enhanced Magnetic Resonance Imaging Using a Dual Fully Convolutional Neural Network. *IEEE Trans. Med. Imag.*, 38(2): 515–524, 2019.
- 47. A. Prakosa, H.J. Arevalo, D. Deng, P.M. Boyle, P.P. Nikolov, H. Ashikaga, J.E. Blauer, E. Ghafoori, C.J. Park, R.C. Blake III, F.T. Han, R.S. MacLeod, H.R. Halperin, D.J. Callans, R. Ranjan, J. Chrispin, S. Nazarian, and N.A. Trayanova. Personalized Virtual-heart Technology for Guiding the Ablation of Infarct-related Ventricular Tachycardia. *Nature Biomed. Eng.*, 2:732–740, 2019.
- 48. J. Lichter, E.G. Kholmovski, N. Coulombe, E. Ghafoori, R. Kamali R.S. MacLeod, and Ravi Ranjan. Real-Time MRI Guided Cryoablation of the Pulmonary Veins with Acute Freeze-Zone and Chronic Lesion Assessment *Europace* 21(1):154–162, 2019.
- 49. S. Guler, M Dannhauer, B. Roig-Solvas, A. Gkogkidis, R.S. MacLeod, T.Ball, J.G. Ojemann, and D.H. Brooks. Computationally Optimized ECoG Stimulation with Local Safety Constraints. *NeuroImage* 173:35-48, June 2018.
- W.W. Good, B. Erem, B. Zenger, J. Coll-Font, H.D. Brooks, and R.S. MacLeod. Temporal Performance of Laplacian Eigenmaps and 3D Conduction Velocity in Detecting Ischemic Stress. *J Electrocardiol.* 51(6S):S116-S120, 2018.
- J.D. Tate, J. Stinstra, T. Pilcher, A. Poursaid, M.A. Jolley, E. Saarel, J. Triedman, and R.S. MacLeod. Measuring defibrillator surface potentials: The validation of a predictive defibrillation computer model. *Comput Biol Med.* 102:402–410, 2018.
- J.D. Tate, K. Gillette, B. Burton, W. Good, B. Zenger, J. Coll-Font, D.H. Brooks, and R.S. MacLeod. Reducing Error in ECG Forward Simulations with Improved Source Sampling. *Front. Physiol.* 9(1304):1–16, 2018.
- M. Cluitmans, D.H. Brooks, R.S. MacLeod, O. Doessel, M. Guillem, P. Van Dam, J. Svehlikova, B. He, J. Sapp, L. Wang, and L.R. Bear. Consensus on validation and opportunities of electrocardiographic imaging: From technical achievements to clinical applications. *Front. Physiol.* 9(1305):1–19, 2018.

- 54. E. Kholmovski, J. Silvernagel, N Angel, S. Vijayakumar, S. Thomas, D. Dosdall, R.S. MacLeod, N. Marrouche, and R. Ranjan. Acute Non-Contrast T1-weighted MRI Predicts Chronic Radio-Frequency Ablation Lesions. *J Cardiovasc. Electrophys.* 29(11): 1556–1562, 2018.
- 55. B.M. Burton, K.K. Aras, W.W. Good, J.D. Tate, B. Zenger, and R.S. MacLeod. Image-Based Modeling of Acute Myocardial Ischemia Using Experimentally Derived Ischemic Zone Source Representations. *J Electrocardiolog.* 51(4): 725–733, 2018.
- 56. B.M. Burton, K.K. Aras, W.W. Good, J.D. Tate, B. Zenger, and R.S. MacLeod. A Framework for Image-Based Modeling of Acute Myocardial Ischemia Using Intramurally Recorded Extracellular Potential. *Ann. Biomed. Eng.* 46(9):1325–1336, 2018.
- 57. K. Yamashita, C. Quang, J.D. Schroeder, E.V. DiBella, F. Han, R.S. MacLeod, D.J. Dosdall, and R. Ranjan. Distance Between the Left Atrium and the Vertebral Body is Predictive of Esophageal Movement in Serial MR Imaging. *J. Interven. Card. Electrophys.* 52(2):149-156, 2018.
- A. Rodenhauser, W.W. Good, B. Zenger, J.D. Tate, K.K. Aras, B.M. Burton, and R.S. Macleod. PFEIFER: Preprocessing Framework for Electrograms Intermittently Fiducialized from Experimental Recordings. *J. Open Source Software*, 3(21), 472. https://doi.org/10.21105/joss.00472, 2018.
- 59. E. Ghafoori and E.G. Kholmovski and S. Thomas and J. Silvernagel and N. Angel and N. Hu and D.J. Dosdall and R. MacLeod and R. Ranjan. Characterization of Gadolinium Contrast Enhancement of Radiofrequency Ablation Lesions in Predicting Edema and Chronic Lesion Size. *Circ. A&E*, 10(11), 2017.
- 60. K.K. Aras, D.J. Swenson, B.M. Burton, and R.S. MacLeod. Spatial Organization of Acute Myocardial Ischemia. *J Electrocardiol*. 49(3):689-692, 2016.
- E.G. Kholmovski, N. Coulombe, J. Silvernagel, N. Angel, D.Parker, R.S. Macleod, N. Marrouche, and R. Ranjan. Real-Time MRI-Guided Cardiac Cryo-Ablation: A Feasibility Study. *J Cardiovasc Electrophysiol*. May;27(5):602-8. doi: 10.1111/jce.12950. PMC4865432 2016.
- 62. B. Erem, R. Martinez Orellana, D.E. Hyde, J.M. Peters, F.H. Duffy, P. Stovicek, S.K. Warfield, R.S. MacLeod, G. Tadmor, and D.H. Brooks. Extensions to a manifold learning framework for time-series analysis on dynamic manifolds in bioelectric signals. *Phys Rev E* 93(4), 1–21. DOI:10.1103/PhysRevE.93.042218, 2016.
- 63. I.A. Polejaeva, R. Ranjan, C.J. Davies, M. Regouski, J. Hall, A.L. Olsen, Q. Meng, H.M. Rutigliano, D.J. Dosdall, N.A. Angel, F.B. Sachse, T. Seidel, A.J. Thomas, R. Stott, K.E. Panter, P.M. Lee, A.J. Van Wettere, J.R. Stevens, Z. Wang, R.S. MacLeod, N.F. Marrouche and K.L. White. Increased Susceptibility to Atrial Fibrillation Secondary to Atrial Fibrosis in Transgenic Goats Expressing Transforming Growth Factor-*β*1. *J Cardiovasc. Electrophy.*, 27:1220-1229, 2016.
- 64. S. Guler, M. Dannhauer, B. Erem, R.S. MacLeod, D. Tucker, S. Turovets, P. Luu, D. Erdogmus, and D.H. Brooks. Optimization of focality and direction in dense electrode array transcranial direct current stimulation (tDCS). *J. Neural Eng.*, 13(3): (Epub), 2016.
- 65. J. Cates, E. Bieging, A. Morris, G. Gardner, N. Akoum, E. Kholmovski, N. Marrouche, C. McGann, R.S. MacLeod. Computational Shape Models Characterize Shape Change of the Left Atrium in Atrial Fibrillation. *Clin. Med. Insights Cardiol.*, 8(S1):11–99, doi: 10.4137/CMC.S15710, 2015.
- 66. B.R. Parmar, T.R. Jarrett, E.G. Kholmovski, N. Hu, D. Parker, R.S. MacLeod, N.F. Marrouche and R. Ranjan. Poor scar formation after ablation is associated with atrial fibrillation recurrence. *J Interv Card Electrophysiol* 44(3):247–256. 2015.
- 67. N. Angel, L. Li, R.S. MacLeod, N. Marrouche, R. Ranjan, and D. Dosdall. Diverse Fibrosis Architecture and Premature Stimulation Facilitate Initiation of Reentrant Activity Following Chronic Atrial Fibrillation. *J Cardiovasc. Electrophys.*, 26(12):1352-60. 2015.
- 68. K.K. Aras, W. Good, J.D. Tate, B.M. Burton, D.H. Brooks, J. Coll-Font, O. Doessel, W. Schulze, D. Patyogaylo, L. Wang, P. Van Dam, and R.S. MacLeod. Experimental Data and Geometric Analysis Repository: EDGAR *J Electrocardiol*. 48(6):975-81, 2015.
- N. Akoum, A. Morris, D. Perry, J. Cates, N. Burgon, E. Kholmovski, R.S. Macleod, and N. Marrouche. Substrate Modification Is a Better Predictor of Catheter Ablation Success in Atrial Fibrillation Than Pulmonary Vein Isolation: An LGE-MRI Study. *Clin. Med. Insights: Cardiol.* 9:25–31, 2015.
- 70. Y. Gao, L. Zhu, J. Cates, R.S. MacLeod, S. Bouix, and A. Tannenbaum. A Kalman Filtering Perspective for Multi-Atlas Segmentation, *SIAM J. on Imag. Sci.*, 8(2);1007–1029, 2015.
- 71. K.S. McDowell, S.S. Zahid, F. Vadakkumpadan, J. Blauer, R.S. MacLeod, and N.A. Trayanova. Virtual Electrophysiological Study of Atrial Fibrillation in Fibrotic Remodeling, *PLoS ONE*, 10(2), 2015.
- 72. J. Cates, E. Bieging, A. Morris, G. Gardner, N. Akoum, E. Kholmovski, N. Marrouche, C. McGann, and R.S. MacLeod. Computational Shape Models Characterize Shape Change of the Left Atrium in Atrial Fibrillation. *Clin Med Insights Cardiol* 8(Suppl 1): 99–109, 2014.
- 73. J.D. Tate, T. Pilcher, K. Aras, B. Burton, R.S. MacLeod. Verification of a Defibrillation Simulation Using Internal Electric Fields in a Human Shaped Phantom. *Comp. in Cardiol.* 41:689-692, 2014.
- 74. B. Zenger, J. Cates, A. Morris, E. Kholmovski, A. Au, R. Ranjan, N Akoum, C. McGann, B. Wilson, N. Marrouche, F.T. Han, and R.S. MacLeod. A Practical Algorithm for Improving Localization and Quantification of Left Ventricular Scar. *Comp. in Cardiol.* 41:105–108, 2014.
- 75. J.E. Blauer, F.T. Han, R. Ranjan, N.F. Marrouche, and R.S. MacLeod. Controlled Activation for Interrogation of the Electrophysiological Substrate, *Comp. in Cardiol.* 41:189–192, 2014.

- 76. J. Coll-Font, B.M Burton, J.D. Tate, B. Erem, D.J. Swenson, D. Wang, D.H. Brooks, P. van Dam, R.S. MacLeod. New Additions to the Toolkit for Forward/Inverse Problems in Electrocardiography within the SCIRun Problem Solving Environment. *Comp. in Cardiol.* 41:213–216, 2014.
- 77. J. Blauer, D.J. Swenson, K. Higuchi, G. Plank, R. Ranjan, N. Marrouche, and R.S. MacLeod. Sensitivity and Specificity of Substrate Mapping: an in silico Framework for the Evaluation of Electroanatomical Substrate Mapping Strategies in *J. Cardiovasc. Electrophys.* 25(7): 774–780, 2014.
- 78. K. Aras, B. Burton, D. Swenson, and R. MacLeod, Sensitivity of epicardial electrical markers to acute ischemia detection. *J. Electrocardiol.* 47(6): 836-41, 2014.
- B.R. Parmar, T.R. Jarrett, N.S. Burgon, E.G. Kholmovski, N.W. Akoum, N. Hu, R.S. Mac-Leod, N.F. Marrouche, and R. Ranjan. Comparison of Left Atrial Area Marked Ablated in Electroanatomical Maps with Scar in MRI *J Cardiovasc. Electrophys.* 25(5):457–463, 2014.
- M. Milanic and V. Jazbinsek and R.S. Macleod and D.H. Brooks and R. Hren. Assessment of regularization techniques for electrocardiographic imaging in *J Electrocardiol* 47(1):20–28, 2014.
- 81. C. McGann, N. Akoum, A. Patel, E. Kholmovski, P. Revelo, K. Damal, B. Wilson, J. Cates, A. Harrison, R. Ranjan, N.S. Burgon, T. Greene, D. Kim, E.V.R. DiBella, D. Parker, R.S. MacLeod, and N.F. Marrouche. Atrial Fibrillation Ablation Outcome Is Predicted by Left Atrial Remodeling on MRI. *Circ A & E*, Feb 1;7(1):23-30, 2014.
- R. Ranjan, D. Dosdall, L. Norlund, K. Higuchi, J.M. Silvernagel, A.L. Olsen, C.J. Davies, R.S. Macleod, and N.F. Marrouche. Diagnostic imaging and pacemaker implantation in a domestic goat with persistent left cranial vena cava. *J Vet Cardiol.* 16(1):45–50, 2014.
- 83. D.J. Dosdall, R. Ranjan, K. Higuchi, E.G. Kholmovski, N. Angel, L. Li, R.S. Macleod, L. Norlund, A. Olsen, C.J. Davies, N.F. Marrouche. Chronic atrial fibrillation causes left ventricular dysfunction in dogs but not goats: experience with dogs, goats, and pigs. *Am J Physiol Heart Circ Physiol*, 305(5):H725-31, 2013.
- 84. R. Karim, Y. Gao, A. Tannenbaum, D. Rueckert, J. Cates, T. Schaeffter, D. Peters, R.S. MacLeod, and K. Rhode. Evaluation of current algorithms for segmentation of scar tissue from late Gadolinium enhancement cardiovascular magnetic resonance of the left atrium: an open-access grand challenge. *J Cardiovasc Magn Reson* 15:105, 2013.
- D. Wang, R.M. Kirby, R.S. MacLeod, and C.R. Johnson. Inverse electrocardiographic source localization of ischemia: An optimization framework and finite element solution. *J. Comp. Phys.* 250:403–424, 2013.
- K.S. McDowell, F. Vadakkumpadan, R. Blake, J. Blauer, G. Plank, R.S. Macleod, and N.A. Trayanova. Mechanistic inquiry into the role of tissue remodeling in fibrotic lesions in human atrial fibrillation. *Biophys. J.* 104(12):2764–2773, 2013.

- 87. K. Higuchi, M. Akkaya, M. Koopmann, J. Blauer, N.S. Burgon, K. Damal, R. Ranjan, E. Kholmovski, R.S. Macleod, N.F. Marrouche. The Effect of Fat Pad Modification during Ablation of Atrial Fibrillation: Late Gadolinium Enhancement MRI Analysis. *Pacing Clin Electrophysiol* Jan 28;(1130), 2013.
- N. Akoum; C. McGann; G. Vergara; T. Badger; R. Ranjan; C. Mahnkopf; E. Kholmovski, R.S. MacLeod and N.F. Marrouche. Atrial Fibrosis Quantified Using Late Gadolinium Enhancement MRI is Associated with Sinus Node Dysfunction Requiring Pacemaker Implant. *J. Cardiovasc. Electrophys.* 23(1):44-50, 2012.
- 89. K.S. McDowell, F. Vadakkumpadan, R. Blake, J. Blauer, G. Plank, R.S. MacLeod, N.A. Trayanova. Methodology for patient-specific modeling of atrial fibrosis as a substrate for atrial fibrillation. *J. Electrocardiol.* 45(6):640–645, 2012.
- 90. R. Ranjan and E.G. Kholmovski, J. Blauer, S. Vijayakumar, N.A. Volland, M.E. Salama, D.L. Parker, R.S. MacLeod, and N.F. Marrouche. Identification and Acute Targeting of Gaps in Atrial Ablation Lesion Sets using a Real Time MRI System. *Circ. A. & E.* 5(6):1130-1135, 2012.
- D.J. Swenson, S.E. Geneser, J.G. Stinstra, R.M. Kirby, and R.S. MacLeod. Cardiac Position Sensitivity Study in the Electrocardiographic Forward Problem Using Stochastic Collocation and BEM. *Ann. Biomed. Eng.*, 39(12):2900–2910, 2011.
- 92. B.M. Isaacson, J.G. Stinstra, R.D. Bloebaum, COL P.F. Pasquina, and R.S. MacLeod. Establishing Multiscale Models for Simulating Whole Limb Estimates of Electric Fields for Osseointegrated Implants. *IEEE Trans. Biomed. Eng.* Oct;58(10):2991–4, 2011.
- 93. C. McGann, E. Kholmovski, J. Blauer, S. Vijayakumar, T. Haslam, J. Cates, E. Dibella, N. Burgon, B. Wilson, A. Alexander, M. Prastawa, M. Daccarett, G. Vergara, N. Akoum, D. Parker, R.S. Macleod, and N.F. Marrouche. Dark regions of no-reflow on late gadolinium enhancement magnetic resonance imaging result in scar formation after atrial fibrillation ablation. *J. Am. Coll. Cardiol.*, 58(2):177–185, 2011.
- 94. N. Akoum, M. Daccarett, C. McGann, N. Segerson, G. Vergara, S. Kuppahally, T. Badger, N. Burgon, T. Haslam, E. Kholmovski, R.S. MacLeod, and N.F. Marrouche. Atrial fibrosis helps select the appropriate patient and strategy in catheter ablation of atrial fibrillation: a DE-MRI guided approach. J. Cardiovasc. Electrophys. 22(1):16–22, 2011.
- 95. G.R. Vergara, S. Vijayakumar, E.G. Kholmovski, J.J. Blauer, M.A. Guttman, C. Gloschat, G. Payne, K. Vij, N.W. Akoum, M. Daccarett, C.J. McGann, R.S. Macleod, and N.F. Marrouche. Real-time magnetic resonance imaging-guided radiofrequency atrial ablation and visualization of lesion formation at 3 Tesla. *Heart Rhythm* 8(2):295-303, 2011.
- 96. M. Daccarett, T.J. Badger, N. Akoum, N.S. Burgon, C. Mahnkopf, G.R. Vergara, E.G. Kholmovski, C.J. McGann, D. Parker, J. Brachmann, R.S. Macleod RS, and Marrouche NF. Association of left atrial fibrosis detected by delayed-enhancement magnetic resonance imaging and the risk of stroke in patients with atrial fibrillation. *J Am Coll Cardiol* 57(7):831-8, 2011.

- 97. M. Daccarett, C.J. McGann, N.W. Akoum, R.S. MacLeod, and N.F. Marrouche. MRI of the left atrium: predicting clinical outcomes in patients with atrial fibrillation. *Expert Rev Cardiovasc Ther* 9(1):105-11, 2011.
- 98. C. Mahnkopf, T.J. Badger, N.S. Burgon, M. Daccarett, T.S. Haslam, C.T. Badger, C.J. Mc-Gann, N. Akoum, E. Kholmovski, R.S. MacLeod, and N.F. Marrouche. Evaluation of the Left Atrial Substrate in Patients with Lone Atrial Fibrillation Using Delayed-Enhanced MRI: Implications for Disease Progression and Response to Catheter Ablation. *Heart Rhythm.* 7(10):1475-81, 2010.
- 99. B.M. Isaacson, J.G. Stinstra, R.S. MacLeod, P.F. Pasquina, and R.D. Bloebaum. Developing a Quantitative Measurement System for Assessing Heterotopic Ossification and Monitoring the Bioelectric Metrics from Electrically Induced Osseointegration in the Residual Limb of Service Members. Ann. Biomed. Eng. 38(9):2968–2978, 2010.
- 100. T.J. Badger, M. Daccarett, N.W., Akoum, Y.A. Adjei-Poku, N.S. Burgon, T.S. Haslam, S. Kalvaitis, S. Kuppahally. G. Vergara L. McMullen, P.A. Anderson PA, E. Kholmovski, R.S. Macleod, and N.F. Marrouche. Evaluation of Left Atrial Lesions after Initial and Repeat Atrial Fibrillation Ablation: Lessons Learned from Delayed-Enhancement MRI in Repeat Ablation Procedures. *Circ Arrhythm Electrophysiol* 3(3):249-59, 2010.
- 101. S.S. Kuppahally. N. Akoum, N.S. Burgon, T.J. Badger, E.G. Kholmovski, S. Vijayakumar, S.N. Rao, J. Blauer, E.N. Fish, E.V. Dibella, R.S., Macleod, C. McGann, S.E. Litwin, and N.F. Marrouche. Left Atrial Strain and Strain Rate in Patients with Paroxysmal and Persistent Atrial Fibrillation: Relationship to Left Atrial Structural Remodeling Detected by Delayed Enhancement-MRI. *Circ Cardiovasc Imaging* 3(3):231–239, 2010.
- 102. M. Jolley, J. Stinstra, J. Tate, S. Pieper, R. Macleod, L. Chu, P. Wang, and J.K. Triedman. Finite element modeling of subcutaneous implantable defibrillator electrodes in an adult torso. *Heart Rhythm.* 7(5):692–698, 2010.
- 103. J.G. Stinstra, R.S. MacLeod, and C.S. Henriquez. Incorporating histology into a 3D microscopic computer model of myocardium to study propagation at a cellular level. *Ann. Biomed. Eng*, 38(4):1399, 2010.
- 104. N.M. Segerson, M. Daccarett, T.J. Badger, A. Shabaan, N. Akoum, E.N. Fish, S.N. Rao, N.S. Burgon, Y. Adjei-Poku, E. Kholmovski, S. Vijayakumar, E.V. Dibella, R.S. Macleod, and N.F. Marrouche NF. Magnetic Resonance Imaging-Confirmed Ablative Debulking of the Left Atrial Posterior Wall and Septum for Treatment of Persistent Atrial Fibrillation: Rationale and Initial Experience. *J Cardiovasc Electrophysiol* 21(2):126-132, 2010.
- 105. T.J. Badger, Y.A. Adjei-Poku, N.S. Burgon, S. Kalvaitis, A. Shaaban, D.N. Sommers, J.J. Blauer, E.N. Fish, N. Akoum, T.S. Haslem, E.G. Kholmovski, R.S. MacLeod, D.G. Adler, and N.F. Marrouche. Initial experience of assessing esophageal tissue injury and recovery using delayed-enhancement MRI after atrial fibrillation ablation. *Circ Arrhythm Electro-physiol* 2009 2(6):620-625, 2009.

- 106. B.M. Isaacson, J.G. Stinstra, R.S. MacLeod, J.B. Webster, J.P. Beck, and R.D. Bloebaum. Bioelectric analyses of an osseointegrated intelligent implant design system for amputees. J Vis Exp 15(29), 1-6, 2009.
- 107. R.S. Macleod, J.G. Stinstra, S. Lew, R.T. Whitaker, D.J. Swenson, M.J. Cole, J. Kruger, 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. Royal Soc.* 367(1896):2293–2310, 2009.
- 108. S. Lew, C.H. Wolters, A. Anwander, S. Makeig, and R.S.MacLeod. Improved EEG source analysis using low-resolution conductivity estimation in a four-compartment finite element head model. *Hum Brain Mapp* 2009 Sep;30(9):2862-78, 2009.
- 109. S. Lew, C.H. Wolters, T. Dierkes, C. Roer, and R.S. MacLeod. Accuracy and run-time comparison for different potential approaches and iterative solvers in finite element method based EEG source analysis. *Applied Num. Math.* 59:1970–1988, 2009
- 110. R.S. Oakes, T.J. Badger, E.G. Kholmovski, N.M. Segerson, E.V.R. DiBella, E. Fish, JE. Blauer, N. Akoum, M. Daccarett, J. Windfelder, C. J. McGann, D. Parker, R.S. MacLeod, N.F. Marrouche. Detection and Quantification of Low Voltage Left Atrial Tissue Using Delayed Enhancement MRI in Patients with Atrial Fibrillation. *Circulation*, 119(13):1758-67, 2009.
- 111. T.J. Badger, R.S. Oakes, M. Daccarett, N.S. Burgon, N. Akoum, E.N. Fish, J.J. Blauer, S.N. Rao, Y. Adjei-Poku, E.G. Kholmovski, S. Vijayakumar, E.V. Di Bella, R.S. MacLeod, and N.F. Marrouche. Temporal left atrial lesion formation after ablation of atrial fibrillation. *Heart Rhythm* 6(2):161–168, 2009.
- 112. J.K. Triedman, M. Jolley, J. Stinstra, D.H. Brooks, and R. MacLeod. Predictive modeling of defibrillation using hexahedral and tetrahedral finite element models: recent advances. *J. Electrocardiol.* 41(6):483–486, 2008.
- 113. D.R. Sutherland, Q. Ni, R.S. MacLeod, R.L. Lux, and B.B. Punske. Experimental Measures of Ventricular Activation and Synchrony. *Pacing Clin Electrophysiol*, 31(12):1560-70, 2008.
- 114. C.J. McGann, E.G. Kholmovski, R.S. Oakes, J.E. Blauer, M. Daccarett, N. Segerson, K.J. Airey, N. Akoum, E. Fish, T.J. Badger, E.V.R. DiBella, D. Parker, R.S. MacLeod, N.F. Marrouche. Extent of left atrial wall injury evaluated by magnetic resonance imaging after pulmonary vein antrum isolation predicts procedural response. *J. Am. Coll Cardiol.*, 52(15):1263–1271, 2008.
- 115. B. Taccardi, B.B. Punske, E. Macchi, R.S. MacLeod, P.R. Ershler. Epicardial and Intramural Excitation During Ventricular Pacing: Effect of Myocardial Structure. *Am J Physiol Heart Circ Physiol* April 294(4), H1753–1766, 2008.
- M. Jolley and J. Stinstra, S. Pieper, R.S. MacLeod, D.H. Brooks, F. Cecchin, and J.K. Triedman. A Computer Modeling Tool for Comparing Novel ICD Electrode Orientations in Children and Adults. *Heart Rhythm*, 5(4): 565–572, 2008.

- 117. S.E. Geneser, R.M. Kirby, and R.S. MacLeod. Application of Stochastic Finite Element Methods to Study the Sensitivity of ECG Forward Modeling to Organ Conductivity, In *IEEE Transactions on Biomedical Engineering*, 55(1):31–40, 2008.
- 118. S, Shome, R.L. Lux, B.B. Punske, and R.S. MacLeod. Ischemic preconditioning protects against arrhythmogenesis through maintenance of both active as well as passive electrical properties in ischemic canine hearts. *J Electrocardiol.* 40(6):S150-9, 2007.
- 119. Shibaji Shome and Rob MacLeod. Characterization of the transmural myocardial electrocardiographic response in in vivo canine working hearts under reduced flow and increased heart rate *J Electrocardiol*. 40(4):S5-6, 2007.
- 120. A. Ghodrati, D.H. Brooks, R.S. MacLeod. Methods of solving reduced lead systems for inverse electrocardiography. *IEEE Trans. Biomed. Eng.* 54(2):339–343, 2007.
- 121. B. Yilmaz, R.S. MacLeod, B.B. Punske, B. Taccardi, and D.H. Brooks. Generalized training subset selection for statistical estimation of epicardial activation maps from intravenous catheter measurements. *Comp. in Biol. and Med.* 37(3):328–336, 2007.
- Y. Serinagaoglu, D.H. Brooks, and R.S. MacLeod. Improved performance of Bayesian solutions for inverse electrocardiography using multiple information sources. *IEEE Trans. Biomed. Eng.* 53(2):2024–2034, 2006.
- 123. A. Ghodrati, D.H. Brooks, G. Tadmor, R.S. MacLeod. Wavefront-based models for inverse electrocardiography. *IEEE Trans. Biomed. Eng.* 53(9): 1821–1831, 2006.
- 124. C.H. Wolters, A. Anwander, X. Tricoche, D.M. Weinstein, M.A. Koch, and R.S. Macleod. Influence of tissue conductivity anisotropy on EEG/MEG field and return current computation in a realistic head model: A simulation and visualization study using high-resolution finite element modeling. *Neuroimage* 30(3):813–826, 2006.
- 125. S. Shome, J.G. Stinstra, C. Henriquez, and R.S. MacLeod. Influence of extracellular potassium and reduced extracellular space on conduction velocity during acute ischemia: a simulation study. J. Electrocardiol. 39(4), S84–85, 2006.
- 126. J.G. Stinstra, S. Shome, B. Hopenfeld, R.S. MacLeod. Modeling the passive cardiac conductivity during ischemia. *Med. Biol. Eng. Comput.* 43(6): 776-782, 2005.
- 127. R.S. MacLeod, S. Shome, J. Stinstra, B.B. Punske, B. Hopenfeld. Mechanisms of Ischemia-Induced ST-Segment Changes. J. Electrocardiol. 38(Suppl): 8–13, 2005.
- 128. R.S. MacLeod, F. Kornreich, A. van Oosterom, P. Rautaharju, R. Selvester, G. Wagner, and C. Zywietz. Report of the first virtual visualization of the reconstructed electrocardiographic display symposium. *J. Electrocardiol.* 38:385–399, 2005.
- 129. B. Yilmaz, R.S. MacLeod, B.B. Punske, B. Taccardi, and D.H. Brooks. Venous Catheter Based Mapping of Ectopic Epicardial Activation: Training Data Set Selection for Statistical Estimation. *IEEE Trans. Biomed. Eng.* 52(11): 1823–1831, 2005.

- 130. J.G. Stinstra, B. Hopenfeld and R.S. Macleod. On the passive cardiac conductivity. *Annals Biomed. Eng.* 33(12):1743-51, 2005.
- Y. Serinagaoglu, D.H. Brooks, R.S. MacLeod. Bayesian Solutions and Performance Analysis in Bioelectric Inverse Problems. *IEEE Trans. Biomed. Eng.* 52(6), 1009–1020, 2005.
- B. Hopenfeld, J.G. Stinstra, and R.S. MacLeod. The Effect of Conductivity on ST Segment Epicardial Potentials Arising from Subendocardial Ischemia. *Annals Biomed. Eng.* 33(6), 751–763, 2005.
- B. Hopenfeld, J.G. Stinstra, and R.S. MacLeod. A Mechanism for One Type of ST Depression During Ischemia. J. Cardiovasc. Electrophys. 15(1), 1200–1206, 2004.
- 134. C.R. Johnson, R.S. MacLeod, S.G. Parker, and D.M. Weinstein. Biomedical Computing and Visualization Software Environments. *Comm. ACM*, 47(11):64–71. 2004.
- J.G. Stinstra, B. Hopenfeld, and R.S. MacLeod. A Model for the Passive Cardiac Conductivity. *Int. J. Bioelectromag*, 5(1):185–186, 2003.
- 136. A. Corlan, R.S. Macleod, L. De Ambroggi. Low Variability of Autocorrelation Maps with Intrathoracic Heart Position *Int. J. Bioelectromag*, 5(1):139–140, 2003.
- 137. Y. Serinagaoglu, D.H. Brooks, R.S. MacLeod. Combining Numerical and Physiological Constraints in Inverse Electrocardiography. *Int. J. Bioelectromag*, 5(1):215–217, 2003.
- B.B. Punske, Q. Ni, R.L. Lux, R.S. MacLeod, P.R. Ershler, Ph.D., T.J. Dustman, M.J. Allison, B. Taccardi. Spatial Methods of Epicardial Activation Time Determination. *Annals of Biomedical Engineering* 31:781–792, 2003.
- Y. Serinağaoğlu, R.S. MacLeod, B. Yilmaz, and D.H. Brooks. Multielectrode venous catheter mapping as a high quality constraint for Electrocardiographic inverse solution. *J. Electrocardiol.* 35 (suppl): 65-74, 2002.
- 140. R.S. MacLeod, B.B. Punske, S. Shome, B. Yilmaz, and B. Taccardi. The Role of Heart Rate and Coronary Flow During Myocardial Ischemia. *J. Electrocardiol.* 34(suppl):43–51, 2001.
- 141. B.M. Horacek, J.W. Warren, C.J. Penney, R.S. MacLeod, L.M. Title, M.J. Gardner, and C.L. Feldman. Optimal electrocardiographic leads for detecting acute myocardial ischemia, *J. Electrocardiol.* 34(suppl):97–111, 2001.
- 142. R.S. MacLeod, Q. Ni, B. Punske, P.R. Ershler, B. Yilmaz, and B, Taccardi. Effects of Heart Position on the Body-Surface ECG. *J. Electrocardiol.* 33:229–238, 2000.
- 143. Q. Ni, R.S. MacLeod, B.B. Punske, and B. Taccardi. Computing and Visualizing Electric Potentials and Current Pathways in the Thorax. *J. Electrocardiol.* 33:189–198, 2000.
- 144. J.E. Burnes B. Taccardi R.S. MacLeod, Y. Rudy. Noninvasive electrocardiographic imaging of electrophysiological abnormal substrates in infarcted hearts. A model study. *Circulation*, 101:533-540, 2000.

- 145. M.S. Fuller, G. Sandor, B.B. Punske, B. Taccardi, R.S. MacLeod, P.R. Ershler, L.S. Green LS, and R.L. Lux. Estimates of Repolarization dispersion from electrocardiographic measurements. *Circulation* 102:685-691, 2000.
- 146. M.S. Fuller, G. Sandor, B.B. Punske, B. Taccardi, R.S. MacLeod, P.R. Ershler, L.S. Green LS, and R.L. Lux. Estimates of Repolarization and its dispersion from electrocardiographic measurements: direct epicardial assessment in the canine heart. *J. Electrocardiol.* 3:171, 2000.
- 147. Q. Ni, R.S. MacLeod, and R.L. Lux. Three-Dimensional Activation Mapping in Canine Ventricles: Interpolation and Approximation of Activation Times. Ann. Biomed. Eng., 27(5):617-626, 1999.
- 148. B.B. Punske, R.L. Lux, R.S. MacLeod, M.S. Fuller, P.R. Ershler, T.J. Dustman, Y. Vyhmeister, and B. Taccardi. Mechanisms of the spatial distribution of QT intervals on the epicardial and body surfaces. J. Cardiovasc. Electrophys. 10(12):1605–1618, 1999.
- 149. R.L. Lux, M.S. Fuller, R.S. MacLeod, P.R. Ershler, B.B. Punske, and B. Taccardi. Noninvasive indices of repolarization and its dispersion *J. Electrocardiol.*, 32(supp):153–157, 1999.
- R.O. Kuenzler, R.S. MacLeod, B. Taccardi, Q. Ni, R.L. Lux. Estimation of Epicardial Activation Maps from Intravascular Recordings. *J. Electrocardiol.*, 32:77–92, 1999.
- 151. D.H. Brooks, G.F. Ahmad, R.S. MacLeod, and G.M. Maratos. Inverse electrocardiography by simultaneous imposition of multiple constraints. *IEEE Trans. Biomed. Eng.* 46(1):3–18, 1999.
- 152. C.R. Johnson and R.S. MacLeod. Adaptive local regularization methods for the inverse ECG problem. *Progress in Biophysics and Biochemistry*, 69(2/3):405, 1998.
- 153. B. Taccardi, B.B. Punske, R.L. Lux, R.S. MacLeod, P.R. Ershler, T.J. Dustman, and Y. Vyhmeister. Useful Lessons from Body Surface Mapping. J. Cardiovasc. Electrophys., 9:773–786, 1998.
- 154. Q. Ni, R.S. MacLeod, R.L. Lux, and B. Taccardi. A novel interpolation method for electric potential fields in the heart during excitation. *Ann. of Biomed. Eng.*, 26(4):597–607, 1998.
- 155. G.F. Ahmad, D.H. Brooks, and R.S. MacLeod. An admissible solution approach to inverse electrocardiography. *Ann. Biomed. Eng.* 26:278–292, 1998.
- 156. R.S. MacLeod and D.H. Brooks. Recent progress in inverse problems in electrocardiology. *IEEE Eng. in Med. & Biol. Soc. Magazine*, 17(1), 73–83, 1998.
- 157. R.S. MacLeod, R.L. Lux, and B. Taccardi. A possible mechanism for electrocardiographically silent changes in cardiac repolarization. *J. Electrocardiol.*, Vol. 30, Suppl., 114–121, 1997.

- 158. B. Taccardi, B.B. Punske, R.L. Lux, R.S. MacLeod, P.R. Ershler, T.J. Dustman. Relationships between myocardial activity and potentials on the ventricular surface. *J. Electrocardiol.*, Vol. 30, Suppl., 1–4, 1997.
- R.L. Lux, M.S. Fuller, R.S. MacLeod, P.R. Ershler, L.S. Green, and B. Taccardi. QT dispersion: dispersion of ventricular repolarization or dispersion of QT interval? *J. Electrocardiol.*, Vol. 30, Suppl., 176–180, 1997.
- R.N. Klepfer, C.R. Johnson, and R.S. MacLeod. The effects of inhomogeneities and anisotropies on electrocardiographic fields: A three-dimensional finite element study. *IEEE Trans. BME*, 44(8):706–719, 1997.
- B. Taccardi, R.L. Lux, P.R. Ershler, R.S. MacLeod, T.J. Dustman, and N. Ingebrigtsen. Anatomical architecture and electrical activity of the heart *Acta cardiologica*, 52(2):91–105, 1997.
- 162. D.H. Brooks and R.S. MacLeod. Electrical imaging of the heart: electrophysiological underpinnings and signal processing opportunities. *IEEE Signal Processing*, 14(1):24–42, 1996.
- D.H. Brooks, R.S. MacLeod, R.V. Chary, R.J. Gaudette, and H. Krim. Temporal and spatial analysis of potential maps via multi-resolution decompositions. *J. Electrocardiol.* Vol. 29, Suppl., 114–124, 1996.
- 164. R.S. MacLeod, R.L. Lux, M.S. Fuller, and B. Taccardi. Evaluation of novel measurement methods for detecting heterogeneous repolarization. *J. Electrocardiol.* Vol. 29, Suppl., 145–153, 1996.
- 165. B. Taccardi, R.L. Lux, R.S. MacLeod, P.R. Ershler, T.J. Dustman, and Y. Vhymeister. ECG waveforms and cardiac electric sources. *J. Electrocardiol.* Vol. 29, Suppl., 98–100, 1996.
- R.S. MacLeod and R.L. Lux. Errors in electrocardiographic parameter estimation from standard leadsets. J. Electrocardiol. Vol. 28, Suppl., pages 98–103, 1995.
- R.L. Lux and R.S. MacLeod. Estimating electrocardiographic distributions from small numbers of leads. J. Electrocardiol. Vol. 28, Suppl., pages 92–98, 1995.
- 168. F. Kornreich, R.L. Lux, and R.S. MacLeod. Map representation and diagnostic performance of the standard 12-lead ECG. *J. Electrocardiol.*, Vol. 28, Suppl., pages 121–123, 1995.
- R.S. MacLeod, M.J. Gardner, R. Miller, and B. M. Horáček. Application of an inverse solution to the localization of ischemia during percutaneous transluminal coronary angioplasty. *J. Cardiovasc. Electrophys.* Vol 6, pages 2–18, 1995.
- 170. B. Taccardi, R.L. Lux, P.R. Ershler, R.S. MacLeod, and Y. Vyhmeister. Modern views on the spread of excitation in anisotropic heart muscle. *Japanese Heart Journal*, 35 Suppl., pages 31–35, 1994.
- 171. R.S. MacLeod, D.H. Brooks, H. On, H. Krim, R.L. Lux, and F. Kornreich. Analysis of PTCA-induced ischemia using both an electrocardiographic inverse solution and the wavelet transform. *J. Electrocardiol.* Vol. 27, Suppl., pages 90–96, 1994.

- 172. F. Kornreich, R.S. MacLeod, V. Dzavik, A.M. Kornreich, E. Stoupel, J. de Almeida, D. Walker, and T.J. Montague. Body surface potential mapping of QRST changes during and after percutaneous transluminal coronary angioplasty. *J. Electrocard*. Vol. 27, Suppl., 1994.
- 173. R.L. Lux, L.S. Green, R.S. MacLeod, and B. Taccardi. Assessment of spatial and temporal characteristics of ventricular repolarization from the body surface. *J. Electrocard.* Vol. 27, Suppl., 1994.
- 174. C.R. Johnson and R.S. MacLeod. Nonuniform spatial adaption using *a posteriori* error estimate: applications to forward and inverse problems. *Appl. Num. Anal.* 14:311–326, 1994.
- 175. C.R. Johnson, R.S. MacLeod, and M.A. Matheson. Computational medicine: bioelectric field problems. *IEEE Computer*, 26(10): 59–67, 1993.
- 176. R.S. MacLeod, C.R. Johnson, and M.A. Matheson. Visualizing bioelectric fields. *IEEE Computer Graphics and Applications*, 14(3): 10–12, 1993.
- 177. C.R. Johnson, R.S. MacLeod, and P.R. Ershler. A computer model for the study of electrical current flow in the human thorax. *Comp. in Bio. and Med.*, 22:305–323, 1992.
- 178. C.R. Johnson, R.S. MacLeod, and M. Matheson. Computer simulations reveal complexity of electrical activity in the human thorax. *Comp. in Phys.* 6(3):230–237, 1992.
- T.J. Montague, F.X. Witkowski, R.M. Miller, M.A. Henderson, R.G. Macdonald, R.S. Mac-Leod, M.G. Gardner, and B.M. Horáček. Persistent changes in the body surface electrocardiogram following successful coronary angioplasty. *J. Electrocardiol.* 22-Suppl., 91–98, 1989.
- B. Koidl, H.A. Tritthart, and R.S. MacLeod. Different effects of calcium-antagonists on automaticity in single pacemaker cells in synchronized networks of cultured embryonic heart muscle cells. J. Mol. Cell. Cardiol., 1:207–217, 1986.

Book Chapters

- 1. R.S. MacLeod and J.J.E. Blauer. Atrial Fibrillation. In *Multimodal Cardiovascular Imaging: Principles and Clinical Applications* O. Pahlm and G. Wagner (Eds.), McGraw Hill, 2011.
- 2. R.S. MacLeod and M. Buist. The Forward Problem of Electrocardiography. In *Comprehensive Electrocardiology*, P.W. Macfarlane, A. van Oosterom, O. Pahlm, P. Kligfield, M. Janse, and J. Camm (Eds.), Springer Verlag, 2010.
- A.J. Pullan, L.K.Cheng, M.P. Nash, D.H. Brooks, A. Ghodrati, and R.S. MacLeod. The Inverse Problem of Electrocardiography. In *Comprehensive Electrocardiology*, P.W. Macfarlane, A. van Oosterom. van, O. Pahlm, P. Kligfield, M. Janse, and J. Camm (Eds.), Springer Verlagm 2010.

- S. Shome and R.S. MacLeod. Simultaneous high-resolution electrical imaging of endocardial, epicardial and torso-tank surfaces under varying cardiac metabolic load and coronary flow. In *Functional Imaging and Modeling of the Heart*, Springer-Verlag, Pages 320–329, 2007.
- M. Jolley, J. Stinstra, D. Weinstein, S. Pieper, R. San Jose Estepar, G. Kindlmann, R.S. MacLeod, D.H. Brooks, J.K. Triedman. Open-Source Environment for Interactive Finite Element Modeling of Optimal ICD Electrode Placement. In *Functional Imaging and Modeling of the Heart*, Springer-Verlag, Pages 373–382. 2007
- 6. R.S. MacLeod, Q. Ni, and B. Taccardi. Modeling Cardiac Bioelectricity in Realistic Volumes: How Real is Real? In M.J. Schalij, M.J. Janse, A. van Oosterom, H.J.J. Wellens, E.E. van der Wall (eds), *Einthoven 2002*. The Einthoven Foundation, Leiden, 45-56, 2002.
- R.L. Lux, M. Akhtar, and R.S. MacLeod. Mapping and Invasive Analysis. In *Foundations* of Cardiac Arrhythmias: Basic and Clinical Approaches, P.M. Spooner and M.R. Rosen editors. Pages 393–424. Marcel Dekker, 2001.
- 8. R.S. MacLeod and D.H. Brooks. Validation Approaches for Electrocardiographic Inverse Problems. In *Computational Inverse Problems in Electrocardiography*, Peter Johnston, editor. Pages 229–268, 2000. WIT Press.
- 9. C.R. Johnson, and R.S. MacLeod. Local regularization and adaptive methods for the inverse Laplace problem. In D.N. Ghista, editor, *2nd Gauss Symposium: Medical Mathematics and Physics*, Vieweg-Verlag, Wiesbaden 1994.
- C.R. Johnson and R.S. MacLeod. Inverse solutions for electric and potential field imaging. In R.L. Barbour, and M.J. Carvlin, editors, *Physiological Imaging, Spectroscopy, and Early Diagnostic Methods*, vol. 1887, pages 130–139, SPIE, 1993.
- 11. C.R. Johnson and R.S. MacLeod. Computational studies of forward and inverse problems in electrocardiology. In J. Eisenfeld, M. Witten, and D.S. Levine, editors, *Biomedical Modeling and Simulation*, pages 283–290. Elsevier, Amsterdam, 1992.

Technical Reports

- 1. R.S. Oakes, R.S. MacLeod, C.J. McGann, E.V.R. Di Bella, E.G. Kholmovski, and N.F. Marrouche. MRI in the EP Lab: A Novel Method to Facilitate Treatment of Atrial Fibrillation. *Siemens Magnetrom FLASH*. December 2007. Invited Review.
- R.S. MacLeod, P.R. Ershler, C.R. Johnson, and M.A. Matheson. Map3d: Scientific visualization program for multichannel time series data on unstructured, three-dimensional meshes. Program User's Guide. Technical Report # UUCS-94-016, University of Utah, 1994.
- 3. R.S. MacLeod, C.R. Johnson, and P.R. Ershler. Construction of a human torso model from magnetic resonance images for problems in computational electrocardiography. Technical Report # UUCS-94-017, University of Utah, 1994.

 J.A. Schmidt, C.R. Johnson, J.A. Eason, and R.S. MacLeod. Applications of automatic mesh generation and adaptive methods in computational medicine. In J. Flaherty and I. Babuska, editors, *Modeling, Mesh Generation, and Adaptive Methods for Partial Differential Equations*, pages 367–394. Springer-Verlag, 1994.

Peer-reviewed Proceedings Articles, Abstracts, and Posters

- J. Bergquist, B. Zenger, J. Brundage, R.S. MacLeod R. Shah, X. Ye, A. Lyones, R. Ranjan, T. Tasdizen, T. Bunch, and B. Steinberg. Comparison of Machine Learning Detection of Low Left Ventricular Ejection Fraction Using Individual ECG Leads. *Comput. in Cardio.* 2023
- J. Bergquist, M. Lange, B. Zenger, B. Orkild, E. Paccione, E. Kwan, B. Hunt, J. Dong, R.S. MacLeod, A. Narayan, and R. Ranjan. Uncertainty Quantification of the Effect of Variable Conductivity in Ventricular Fibrotic Regions on Ventricular Tachycardia *Comput. in Cardio.* 2023
- 3. A. Busatto, L. Rupp, K. Gillette, A. Narayan, G. Plank, and R.S. MacLeod. Capturing the Influence of Conduction Velocity on Epicardial Activation Patterns Using Uncertainty Quantification. *Comput. in Cardiol.* 50:1-4 2023.
- 4. L. Rupp, A. Busatto, J. Bergquist, K. Gillette, A. Narayan, G. Plank, and R.S. MacLeod. Uncertainty Quantification of Fiber Orientation and Epicardial Activation. *Comput. in Cardiol.* 50:1-4 2023.
- 5. B. Hunt, E. Kwan, T. Tasdizen, J. Bergquist and M. Lange, B. Orkild, R.S. MacLeod, D. Dosdall, and R. Ranjan. Transfer Learning for Improved Classification of Drivers in Atrial Fibrillation. *Comput. in Cardiol.* 50:1-4 2023.
- B. Orkild, J. Bergquist, E. Paccione, M. Lange and E. Kwan, B. Hunt, R.S. MacLeod, A. Narayan, and R. Ranjan. A Grid Search of Fibrosis Thresholds for Uncertainty Quantification in Atrial Flutter Simulations. *Comput. in Cardiol.* 50:1-4 2023.
- E. Paccione, M. Lange, B. Orkild, J. Bergquist and E. Kwan, B. Hunt, D. Dosdall, R.S. MacLeod, and R. Ranjan. Effects of Biventricular Pacing Locations on Anti-Tachycardia Pacing Success in a Patient-Specific Model. *Comput. in Cardiol.* 50:1-4 2023.
- 8. L. Bear, J. Svehlikova, J.A. Bergquist, W.W. Good, A. Rababah, J. Coll-Font, R.S. MacLeod, E. van Dam, and R. Dubois. Impact of baseline drift removal on ECG beat classification and alignment. *Comput Cardiol 2021*. 2021
- 9. J. Brundage, V. Suliafu, J.A. Bergquist, B. Zenger, L.C. Rupp, J.D. Tate, R.S. MacLeod, and B. Wang. Myocardial Ischemia Detection Using Body Surface ECG Recordings and Machine Learning. *Comput Cardiol 2021*. 2021
- M. Lange, E. Kwan, R.S. MacLeod, and R. Ranjan. Computer Simulations Outcomes of Left Atrial Arrhythmia Induction are Highly Sensitive to Scar and Fibrosis Determination. *Comput Cardiol 2021*. 2021

- 11. J.A. Bergquist, B. Zenger, L.C. Rupp, A. Narayan, and R.S. MacLeod. Uncertainty Quantification in Simulations of Myocardial Ischemia. *Comput Cardiol 2021*. 2021
- 12. L.C. Rupp, J.A. Bergquist, B. Zenger, K. Gillette, A. Narayan, G. Plank, and R.S. MacLeod. The Role of Myocardial Fiber Direction in Epicardial Activation Patterns via Uncertainty Quantification. *Comput Cardiol 2021*. 2021
- J.D. Tate, S. Elhabian, N. Zemzemi, W.W. Good, M. Boonstra, P. van Dam, D.H. Brooks, A. Narayan, and R.S. MacLeod. A Cardiac Shape Model for Segmentation Uncertainty Quantification. *Comput Cardiol 2021*. 2021
- 14. B. Hunt, E. Kwan, D. Dosdall, R.S. MacLeod, and R. Ranjan. Siamese Neural Networks for Small Dataset Classification of Electrograms. *Comput Cardiol 2021*. 2021
- B. Hunt, E. Kwan, M. McMillan, D. Dosdall, R.S. MacLeod, and R. Ranjan. Deep Learning Based Prediction of Atrial Fibrillation Disease Progression with Endocardial Electrograms in a Canine Model. *Comput Cardiol 2020*. 2020 Sep;47:10.22489/cinc.2020.291. doi: 10.22489/cinc.2020.291. PMCID: PMC8286069.
- A.E. Morgan, A. Kashani, B. Zenger, L.C. Rupp, M.D. Perez, M.D. Foote, A.K. Morris, M.B. Ratcliffe, J.J. Kim, J.W. Weinsaft, V. Sharma, R.S. MacLeod, and S. Elhabian. Right Ventricular Shape Distortion in Tricuspid Regurgitation. *Comput Cardiol 2020* Sep;47. doi: 10.22489/cinc.2020.346. PMCID: PMC7992117.
- L.C. Rupp, W.W. Good, J.A. Bergquist, B. Zenger, K. Gillette, G. Plank, and R.S. MacLeod. Effect of Myocardial Fiber Direction on Epicardial Activation Patterns. *Comput Cardiol* 2020 Sep;47:10.22489/cinc.2020.399. doi: 10.22489/cinc.2020.399. PMCID: PMC8084599.
- 18. L.C. Rupp, Z. Liu, J.A. Bergquist, S. Rampersad, D. White, J.D. Tate, D.H. Brooks, A. Narayan, and R.S. MacLeod. Using UncertainSCI to Quantify Uncertainty in Cardiac Simulations. *Comput Cardiol 2020*.
- J.A. Bergquist, J. Coll-Font, B. Zenger, L.C. Rupp, W.W. Good, D.H. Brooks, and R.S. MacLeod. Improving Localization of Cardiac Geometry Using ECGI. *Comput Cardiol 2020* Sep;47:10.22489/cinc.2020.273. doi: 10.22489/cinc.2020.273. PMCID: PMC8082332.
- B. Zenger, J.A. Bergquist, W.W. Good, L.C. Rupp, and R.S. MacLeod. Experimental Validation of a Novel Extracellular-Based Source Representation of Acute Myocardial Ischemia. *Comput Cardiol 2020* Sep;47:10.22489/cinc.2020.190. doi: 10.22489/cinc.2020.190. PM-CID: PMC8084598.
- W.W. Good, B. Zenger, J.A. Bergquist, L.C. Rupp, K. Gillette, G. Plank, and R.S. MacLeod. Quantifying the Spatiotemporal Influence of Acute Myocardial Ischemia on Volumetric Conduction Speeds. *Comput Cardiol 2020* Sep;47:10.22489/cinc.2020.279. doi: 10.22489/cinc.2020.279. PMCID: PMC8082333.
- 22. B. Zenger, J.A. Bergquist, W.W. Good, B. Steadman, and R.S. MacLeod. High-Capacity Cardiac Signal Acquisition System for Flexible, Simultaneous, Multidomain Acquisition.

Comput Cardiol 2020 Sep;47:10.22489/cinc.2020.188. doi: 10.22489/cinc.2020.188. PM-CID: PMC8106231.

- J.A. Bergquist, B. Zenger, W.W. Good, L.C. Rupp, L.R. Bear, and R.S. MacLeod. Novel Experimental Preparation to Assess Electrocardiographic Imaging Reconstruction Techniques. *Comput Cardiol 2020* Sep;47:10.22489/cinc.2020.458. doi: 10.22489/cinc.2020.458. PM-CID: PMC8082331.
- J.D. Tate, E. van Dam, W.W. Good, J.A. Bergquist, P. van Dam, and R.S. MacLeod A Unified Pipeline for ECG Imaging Testing *Computing in Cardiology* (Vol. 46, pp. 1–4). Singapore. 2019.
- 25. J.A. Bergquist, W.W. Good, B. Zenger, J.D. Tate, and R.S. MacLeod Optimizing the Reconstruction of Cardiac Potentials Using a Novel High Resolution Pericardiac Cage *Computing in Cardiology* (Vol. 46, pp. 1–4). Singapore. 2019.
- 26. W.W. Good, K. Gillette, J.A. Bergquist, B. Zenger, J.D. Tate, G. Plank, and R.S. MacLeod Validation of Intramural Wavefront Reconstruction and Estimation of 3D Conduction Velocity *Computing in Cardiology* (Vol. 46, pp. 1–4). Singapore. 2019.
- R. Ranjan, E. Ghafoori, R. Kamali, E. Kwan, K. Yamashita, R.S. MacLeod, and D. Dosdall. Regions of High Dominant Frequency in Chronic Atrial Fibrillation Anchored to Areas of Atrial Fibrosis *Computing in Cardiology* (Vol. 46, pp. 1–4). Singapore. 2019.
- 28. B. Zenger, J.A. Bergquist, W.W. Good, J.D. Tate, and R.S. MacLeod Experimental Validation of Image-Based Modeling of Torso Surface Potentials During Acute Myocardial Ischemia. *Computing in Cardiology* (Vol. 46, pp. 1–4). Singapore. 2019.
- 29. Y.S. Dogrusoz, L. Bear, J.A. Bergquist, R. Dubois, W.W. Good, R.S. MacLeod, A. Rababah, and J. Stoks. Effects of Interpolation on the Inverse Problem of Electrocardiography. *Computing in Cardiology* (Vol. 46, pp. 1–4). Singapore. 2019.
- Y.S. Dogrusoz, L.R. Bear, J. Svehlikova, J. Coll-Font, W.W. Good, R. Dubois, E. van Dam E, and R.S. MacLeod. *Computing in Cardiology* (Vol. 45, pp. 1–4). Maastricht, Netherlands. 2018.
- J.D. Tate, N. Zemzemi, W.W. Good, P. van Dam, P., D.H. Brooks, and R.S. MacLeod, Effect of segmentation variation on ECG imaging. *Computing in Cardiology* (Vol. 45, pp. 1–4). Maastricht, Netherlands. 2018.
- 32. B. Zenger, W.W. Good, J.A. Bergquist, J.D. Tate, V. Sharma, and R.S. MacLeod. Electrocardiographic Comparison of Dobutamine and BRUCE Cardiac Stress Testing With High Resolution Mapping in Experimental Models. *Computing in Cardiology*, (Vol. 45, pp. 1–4.) Maastricht, Netherlands. 2018.
- 33. W.W. Good, B. Erem, J. Coll-Font, B. Zenger, B., B.M. Horacek, D.H. Brooks, and R.S. MacLeod. Novel Metric Using Laplacian Eigenmaps to Evaluate Ischemic Stress on the Torso Surface. In Computing in Cardiology (Vol. 45 pp. 1-4) Maastricht, Netherlands. 2018.

- 34. C. Charlebois, K. Shayestehfard, D. Nesterovich Anderson, A. Janson, J. Cronin, M. Dannhauer, D. Caldwell, S. Rampersad, L. Sorensen, J. Ojemann, D.H. Brooks, R.S. MacLeod, C. Butson, and A. Dorval. Quantification of Lead Localization Uncertainty in Computational Modeling of Electrocorticography Stimulation and Recording. *Biomedical Engineering Society*, Atlanta, GA, 2018.
- 35. C. Charlebois, K. Shayestehfard, D. Nesterovich Anderson, A. Janson, J. Cronin, M. Dannhauer, D. Caldwell, S. Rampersad, L. Sorensen, J. Ojemann, D.H. Brooks, R.S. MacLeod, C. Butson, and A. Dorval. Validating Cortical Surface Electrode Localization Uncertainty with Simulation and Clinical Stimulation. *Society for Neuroscience*, 2018.
- M. Cluitmans, S. Ghimire, J. Dhamala, J. Coll-Font, J.D. Tate, S. Giffard-Roisin, J. Svehlikova, O. Doessel, M. S Guillem, D.H. Brooks, R.S. MacLeod, and L. Wang. Noninvasive localization of premature ventricular complexes: A research-community-based approach. *European Heart Rhythm Society*, Barcelona, Spain. 2018.
- W.W. Good, B. Erem, J. Coll-Font, D.H. Brooks, and R.S. MacLeod. Detecting Ischemic Stress to the Myocardium Using Laplacian Eigenmaps and Changes to Conduction Velocity. *Computing in Cardiology*, Vol 44. DOI:10.22489/CinC.2017.269-417, 2017.
- S. Ghimire, J. Dhamala, J. Coll-Font, J.D. Tate, M.S. Guillem, D.H. Brooks, R.S MacLeod, and Linwei Wang. Overcoming Barriers to Quantification and Comparison of Electrocardiographic Imaging Methods: A Community-Based Approach. *Computing in Cardiology*, Vol 44. DOI:10.22489/CinC.2017.370-289, 2017.
- J.D. Tate, K. Gillette, B. Burton, W.W. Good, J. Coll-Font3, D.H. Brooks, and R.S. Mac-Leod. Analyzing Source Sampling to Reduce Error in ECG Forward Simulations. *Computing in Cardiology*, Vol 44. DOI:10.22489/CinC.2017.371-097, 2017.
- 40. S. Guler, M. Dannhauer, B. Roig-Solvas, A. Gkogkidis, R.S. MacLeod, T. Ball, J.G. Ojemann, D.H. Brooks. Optimizing stimulus pattern for cortical arrays with no hot-spots. Invited presentation at *2nd Annual Epilepsy Retreat*, University of Freiburg, Freiburg, Germany. 2016.
- 41. B.M. Burton, J.D. Tate, W. Good, R.S. Macleod. The Role of Reduced Left Ventricular, Systolic Blood Volumes in ST Segment Potentials Overlying Diseased Tissue of the Ischemic Heart. *Computing in Cardiology*, Vol 43. DOI:10.22489/CinC.2016.063-524, 2016.
- J. Coll-Font, J. Dhamala, D. Potyagaylo, W.H. Schulze, J.D. Tate, M.S. Guillem, P. van Dam, O. Dossel, D.H. Brooks, R.S. Macleod. The Consortium for Electrocardiographic Imaging. *Computing in Cardiology*, Vol 43, DOI:10.22489/CinC.2016.094-431, 2016.
- 43. K. Gillette, J.D. Tate, B. Kindall, W. Good, J. Wilkinson, N. Simha, and R.S. MacLeod. Temporal Dilation of Animal Cardiac Recordings Registered to Human Torso Geometries. *Computing in Cardiology*, Vol 43, DOI:10.22489/CinC.2016.095-426, 2016.
- 44. W.W. Good, B. Erem, J. Coll-Font3, D.H. Brooks, and R.S. MacLeod. Novel Biomarker for Evaluating Ischemic Stress Using an Electrogram Derived Phase Space. *Computing in Cardiology*, Vol 43, DOI:10.22489/CinC.2016.305-511, 2016.

- 45. J.D. Tate, B. Kindall, K. Gillette, B. Burton, J. Coll-Font, B. Erem, D. White, A. Khan, P. van Dam, and R.S. MacLeod. A Pipeline for Generating Physiological Volumetric ECG Signals. *Internat. Soc. of Computerized Elecetrocardiol (ISCE)*, 2016.
- 46. J. Coll-Font, B. Roig-Solvas, P. van Dam, R.S. MacLeod, D. Brooks. Tracking the heart movement with the ECG; a way of improving the inverse problem in electrocardiography? *Internat. Soc. of Computerized Electrocardiol (ISCE)*, 2016.
- 47. D. Hyde, M. Dannhauer, S.K. Warfield, R.S. MacLeod, D.H. Brooks. Evaluation of Numerical Techniques for Solving the Current Injection Problem in Biological Tissues. 2016 IEEE International Symposium on Biomedical Imaging
- 48. S. Guler, M. Dannhauer, B. Erem, R.S. MacLeod, D. Tucker, S. Turovets, P. Luu, W. Meleis, D.H. Brooks. Optimizing Stimulus Patterns for Dense Array Tdcs with Fewer Sources Than Electrodes Using a Branch and Bound Algorithm. 2016 IEEE International Symposium on Biomedical Imaging
- 49. K. Gillette, J.D. Tate, B. Kindall, P. Van Dam, E. Kholmovski, R.S. MacLeod. Generation of Combined-Modality Tetrahedral Meshes *Computing in Cardiology*, 2015.
- 50. N.A. Angel, E.G. Kholmovski, D.J. Dosdall, R.S. Macleod, N.F. Marrouche, and R. Ranjan. Regions of High Dominant Frequency in Chronic Atrial Fibrillation Anchor to Areas of Atrial Fibrosis Determined by T1 Mapping MRI. *Heart Rhythm Soc.* 2015.
- B. Zenger, J. Cates, A. Morris, E. Kholmovski, A. Au, R. Ranjan, N. Akoum, C. McGann, B. Wilson, N. Marrouche, F.T. Han and R.S. MacLeod. A practical algorithm for improving localization and quantification of left ventricular scar *Computing in Cardiology Conference* (*CinC*), 2014.
- 52. J. Coll-Font, B.M. Burton, J.D. Tate, B. Erem, D.J. Swenson, D. Wang, D.H. Brooks, P. van Dam, and R.S. MacLeod. New Additions to the Toolkit for Forward/Inverse Problems in Electrocardiography within the SCIRun Problem Solving Environment. *Computing in Cardiology Conference (CinC)*, 2014.
- 53. J. Tate, T. Pilcher, K.K. Aras, B.M. Burton, and R.S. MacLeod. Verification of a Defibrillation Simulation Using Internal Electric Fields in a Human Shaped Phantom. *Computing in Cardiology Conference (CinC)*, 2014.
- 54. J.E. Blauer, F. Han, R. Ranjan, N.F. Marrouche, and R.S. MacLeod. Controlled Activation for Interrogation of the Electrophysiological Substrate. *Computing in Cardiology Conference*, 2014.
- 55. S. Guler, M. Dannhauer, B. Erem, R.S. MacLeod, D. Tucker, S. Turovets, P. Luu, W. Meleis, D. Erdogmus, and D. Brooks Approximating fully optimized dense array tDCS with a single current source. *Proceedings of the Organization for Human Brain Mapping*, 2014.
- 56. J. Cates, A. Morris, E. Bieging, E. Kholmovski, S. Bengali, R.S. MacLeod, and C. McGann. Towards a Practical Clinical Workflow for Cardiac Shape Modeling, with Application to

Atrial Fibrillation and Stroke. *1st Symposium on Statistical Shape Models and Applications* June 11-13, 2014.

- 57. B.M. Burton, B. Erem, K. Potter, P. Rosen, C.R. Johnson, D.H. Brooks, and R.S. MacLeod. Uncertainty visualization in forward and inverse cardiac models in *Computing in Cardiology*, 2013, pp. 57–60, 2013.
- 58. G. Gardner and A. Morris and K. Higuchi and R.S. MacLeod and J. Cates. A Point-Correspondence Approach to Describing the Distribution of Image Features on Anatomical Surfaces, with Application to Atrial Fibrillation in 2013 IEEE 10th International Symposium on Biomedical Imaging (ISBI), pp. 226–229, 2013.
- 59. K. Aras, B. Burton, D.J. Swenson, R.S. MacLeod. Sensitivity of epicardial electrical markers to ischemia detection. *International Congress on Electrocardiology 2013*, 2013. *J Electrocardiol.* 46:e31, 2013.
- 60. M. Dannhauer and D. Brooks and D. Tucker and R. MacLeod. A pipeline for the simulation of transcranial direct current stimulation for realistic human head models using SCIRun/BioMesh3D. In *Proceedings of the 2012 IEEE Int. Conf. Eng. in Med. and Biol. Soc. (EMBC)*, pp. 5486–5489, 2012.
- 61. L. Zhu, Y. Gao, A. Yezzi, R.S. MacLeod, J. Cates, and A. Tannenbaum. Automatic segmentation of the left atrium from MRI images using salient feature and contour evolution. In:*Proceedings of the 2012 IEEE Int. Conf. Eng. in Med. and Biol. Soc. (EMBC)*, pp. 3211–3214, 2012.
- 62. D.J. Swenson and J.A. Levine and R.T. Whitaker and R.S. MacLeod. Impacts of Conformal Meshing on Electrical Cardiac Simulation. In *21st International Meshing Round Table*, 2012.
- 63. N.W. Akoum, A. Morris, D. Perry, J. Cates, N. Burgon, R.S. MacLeod and N.F. Marrouche. Residual Fibrotic Atrial Tissue Is A Major Determinant Of Recurrent Atrial Fibrillation Following Ablation, In *Heart Rhythm Society 2012*, 2012.
- 64. R. Ranjan, E. Kholmovski, S. Vijayakumar, J. Blauer, K. Vij, K. Higuchi, R.S. MacLeod, and N.F. Marrouche. Acute Identification of small gaps in atrial radiofrequency ablation lesion sets using MRI, In *Heart Rhythm Society 2012*, 2012.
- 65. M. Jolley, J.G. Stinstra, J. Tate, R.S. MacLeod, J. Triedman, P. Wang and S. Pieper. Modeling of Optimal Subcutanous ICD Lead Placement in Mixed Transvenous-Subcutaneous Systems, In *Heart Rhythm Society 2012*, 2012.
- 66. K. McDowell, J. Blauer, F. Vadakkumpadan, G. Plank, R.S. MacLeod and N.A. Trayanova. Fibrosis underlies the Breakup of Pulmonary Vein Ectopic Waves in Patient-Specific Atrial Models, In *Heart Rhythm Society 2012*, 2012.
- 67. K. Higuchi, M. Akkaya, J. Blauar, N.S. Burgon, C. Tek, K. Damal, E. Kholmovski, R.S. MacLeod and N.F. Marrouche. The Extent of Fat Pad Modification during Ablation of Atrial

Fibrillation Analyzed using Late Gadolinium Enhanced MRI Correlates with the Degree of Parasympathetic Denervation. In *Heart Rhythm Society 2012*, 2012.

- 68. D. Perry, A. Morris, N. Burgon, C. McGann, R.S. MacLeod, and J. Cates. Automatic classification of scar tissue in late gadolinium enhancement cardiac MRI for the assessment of left-atrial wall injury after radiofrequency ablation. In *SPIE Medical Imaging: Computer Aided Diagnosis*, 2012.
- 69. R.S. MacLeod, J. Blauer, R. Ranjan, N.A. Trayanova, K. McDowell, and G. Plank. Subject specific, image based analysis and modeling in patients with atrial fibrillation from MRI. In *International Society for Biomedical Imaging (ISBI)* 2012.
- B.M. Burton, J.D. Tate, B. Erem, D.J. Swenson, D.F. Wang, D.H. Brooks, P.M. van Dam, R.S. MacLeod. A Toolkit for Forward/Inverse Problems in Electrocardiography within the SCIRun Problem Solving Environment. In *Proceedings of the 2011 IEEE Int. Conf. Engineering and Biology Society (EMBC)*, pp. 267–270. 2011.
- D. Wang, R.M. Kirby, R.S. Macleod, and C.R. Johnson. An optimization framework for inversely estimating myocardial transmembrane potentials and localizing ischemia. In *Proc IEEE Eng Med Biol Soc*, 2012, Pages 1680-1683, 2012.
- 72. J.D. Tate, J.G. Stinstra, T.A. Pilcher, A. Poursaid, E.V. Saarel, and R.S. MacLeod. Simulating Defibrillation: Verification Using Defibrillation Thresholds and Surface Recordings. In *Heart Rhythm Society 2011*, 2011.
- 73. T.A. Pilcher, J.D. Tate, J.S. Stinstra, EV Saarel, AE Poursaid, MD Puchalski, and R.S. Mac-Leod. Effect of Spinal Fixation Rods and Abandoned Epicardial Patches on Defibrillation Thresholds Predicted from Computational Simulation. In *Heart Rhythm Society 2011*, 2011.
- 74. K.K. Aras, D.J. Swenson, and R.S. MacLeod. Heterogeneous electrographic myocardial response during ischemia. *J. Electrocardiol.*, 44(6):748, 2011.
- 75. B. Erem, A. Ghodrati, G. Tadmor, R.S. MacLeod, D.H. Brooks. Combining initialization and solution inverse methods for inverse electrocardiography. *J. Electrocardiol.*, 44(2):e63–e64, 2011.
- 76. B. Erem and D.H. Brooks and P.M. van Dam and J.G. Stinstra and R.S. MacLeod. Spatiotemporal estimation of activation times of fractionated ECGs on complex heart surfaces. In *Proc IEEE Eng Med Biol Soc, 2011*, Pages 5884–5887, 2011.
- 77. D.H. Brooks, B. Erem, M. Steffen, J.G. Stinstra, R.S. MacLeod. Combining initialization and solution inverse methods for inverse electrocardiography. *J. Electrocardiol.*, 44(2):e21, 2011.
- T.A. Pilcher, J.D. Tate, J.G. Stinstra, E.V. Saarel, M.D. Puchalski, and R.S. MacLeod. Partially extracted defibrillator coils and pacing leads alter defibrillation thresholds. In *Proceedings of the 15th International Academy of Cardiology World Congress of Cardiology*, 2010.

- 79. R.S. MacLeod, D.J. Swenson, J.G. Stinstra, M. Steffen, D.H.B. Brooks, R.T. Whitaker, and C.R. Johnson. The Utah integrated environment for image based modeling, simulation, and visualization. In *Virtual Physiological Human 2010*.
- 80. J.A. Levine, D.J. Swenson, Z. Fu, R.S. MacLeod, and R.T. Whitaker. A comparison of Delaunay-based meshing algorithms for electrophysiological cardiac simulations. In *Virtual Physiological Human 2010*.
- 81. D.J. Swenson and J. Levine and Z. Fu and R.S. MacLeod. The effect of non-conformal finite element boundaries on electrical monodomain and Bidomain simulations. In *Computers in Cardiology 2010*, (in press), 2010.
- R.S. MacLeod, D.H. Brooks, M. Steffen, B. Erem, D.J. Swenson, and J. Stinstra. Integrated software toolkit for solving bioelectric field problems. In *Computers in Cardiology 2010*, (in press), 2010.
- 83. D. Wang, R.M. Kirby, R.S. MacLeod and C.R. Johnson. A new family of variational-formbased regularizers for reconstructing epicardial potentials from body-surface mapping. In *Computers in Cardiology 2010*, (in press), 2010.
- 84. J. Blauer, J. Cates, N.F. Marrouche and R.S. MacLeod. Atrial tissue response to radio frequency ablation: MRI based characterization of injury. In *Computers in Cardiology 2010*, (in press), 2010.
- 85. J.D. Tate, J.G. Stinstra, T.A. Pilcher and R.S. MacLeod. Implantable cardioverter defibrillator predictive simulation validation. In *Computers in Cardiology 2010*, (in press), 2010.
- 86. G. Vergara, L. McMullan, S. Kalvaitis, E.G. Kholmovski, S. Vijayakumar, J.J.E. Blauer, C. Gloschat, K. Lilbock, G. Payne, N. Akoum, M. Daccaret, M. Gutman, K. Vij, C.J. McGann, R.S. MacLeod, and N.F. Marrouche. Heterogeneous Tissue Injury after Atrial Fibrillaton Ablation Defined by Delayed Enhancement-MRI. In *Heart Rhythm Society 2010*.
- 87. G. Vergara, E.G. Kholmovski, S. Vijayakumar, J.J.E. Blauer, C. Gloschat, K. Lilbock, G. Payne, L. McMullan, S. Kalvaitis, N. Akoum, M. Daccaret, M. Gutman, K. Vij, C.J. Mc-Gann, R.S. MacLeod, and N.F. Marrouche. Real Time MRI-Guided Radiofrequency Ablation and Visualization of Lesion Formation. In *Heart Rhythm Society 2010*.
- N.S. Burgon, T.J. Badger, N. Akoum, G. Vergara, T.S. Haslam, J. Fotheringham, E.G. Kholmovski, R.S. MacLeod, C.J. McGann, and N.F. Marrouche. Assessment of the Left Atrial Substrate in Lone Atrial Fibrillation: Implications for Staging of Atrial Fibrillation. In *Heart Rhythm Society 2010*.
- T.S. Haslam, T.J. Badger, N.W. Akoum, G. Vergara, N.S. Burgon, C. Tek, J. Fotheringham, E.G. Kholmovski, R.S. MacLeod, C.J. McGann, and N.F. Marrouche. Evaluation of the Left Atrial Substrate and Age in Atrial Fibrillation Patients Using Delayed-Enhancement MRI. In *Heart Rhythm Society 2010*.

- 90. T.J. Badger, N.W. Akoum, N.S. Burgon, G. Vergara, T.S. Haslam, J. Fotheringham, E.G. Kholmovski, R.S. MacLeod, C.J. McGann, N.F. Marrouche. Left Atrial Wall Thickness and Its Relationship to Structural Remodeling and Recurrence Following Atrial Fibrillation Ablation. In *Heart Rhythm Society 2010*.
- 91. M. Daccarett, H. Margetts, N. Burgon, T.S. Haslam, J. Ganguli, G. Vergara, L. McMullen, S. Kalvaitis, M. Schmidt, C.J. McGann, E.G. Kholmovski R.S. MacLeod, and N.F. Marrouche. Left Atrial Structural Remodeling Using DE-MRI Independently Predicts Strokes in Patients with Atrial Fibrillation. In *Heart Rhythm Society 2010*.
- 92. M. Daccarett, M. Berdugo, C. Ziegenhorn, N. Burgon, M. Schmidt, G. Vergara, S. Kalvaitis, J. Ganguli, L. McMullen, N. Akoum, R.S. MacLeod, and N.F. Marrouche. Left Atrial Structural Remodeling Utilizing DE-MRI Predicts Early Recurrence of Atrial Fibrillation Following Ablation Procedures. In *Heart Rhythm Society 2010*.
- 93. K.K. Aras, S. Shome, D.J. Swenson, J.G. Stinstra, and R.S. MacLeod. Electrocardiographic response of the heart to myocardial ischemia. In *Computers in Cardiology* 2009, 2009.
- 94. D. Swenson, J. Stinstra, B. Burton, K. Aras, L. Healy, , and R.S. MacLeod. Evaluating the effects of border zone approximations with subject specific ischemia models. In *World Congress on Med. Phys. and Biomed. Eng.*, volume 25/IV, pages 1680–1683, Heidelberg, 2009. Springer.
- 95. D.J. Swenson, J.G. Stinstra, B.M. Burton, K.K. Aras, and R.S. MacLeod. Wave equation based interpolation on volumetric cardiac electrical potentials. In *Computers in Cardiology* 2009, page (in press), 2009.
- 96. B. Isaacson, J. Stinstra, R.S. MacLeod, R. Bloebaum. Development of an electrical stimulation device for osseointegrated amputees: A novel approach for expediting skeletal attachment and rehabilitation. *Biodevice Design*, Lisabon, Portugal, 2009.
- 97. R.S. MacLeod, E. Kholmovski, E.V.R. DiBella, R.S Oakes, J.E. Blauer, E. Fish, S. Vijayakumar, M. Daccarett, N.M. Segerson, and N.F. Marrouche. Integration of MRI in Evaluation and Ablation of Atrial Fibrillation. *Computers in Cardiology*, Bologna, Italy, 2008.
- 98. J.G. Stinstra, M.A. Jolley, J.D. Tate, D.H. Brooks, J.K. Triedman, and R.S. MacLeod. The Role of Volume Conductivities in Simulation of Implantable Defibrillators. *Computers in Cardiology*, Bologna, Italy, 2008.
- 99. M. Daccarett, R.S. Oakes, J.J.E. Blauer, N.S. Burgon, T.J Badger, E.G. Kholmovski, E.V.R. DiBella, R.S. MacLeod, and N.F. Marrouche. Quantitative Measurement and Three Dimensional Visualization of Scar Formation Following Pulmonary Vein Isolation for Atrial Fibrillation. In *Heart Rhythm Society 2008*.
- 100. J.J.E Blauer, R.S. Oakes, N.M. Burgon, C.J McGann, T.J Badger, S. Vijayakumar, E.G. Kholmovski, E.V.R DiBella, N.F. Marrouche, and R.S. MacLeod, Ph.D. MRI Assessment and Quantification of Left Atrial Lesions Following Pulmonary Vein Isolation For Atrial Fibrillation. In *Heart Rhythm Society 2008*.

- 101. N. Akoum, R.S. Oakes, T.J. Badger, E.N. Fish, J.J.E. Blauer, C.J. McGann, A. Shaaban, S. Rao, J. Sessions, E.V.E. DiBella, E.G. Kholmovski, S. Vijayakumar, R.S. MacLeod, and N.F. Marrouche. Correlation between Left Atrial Structural Remodeling with Persistence and Recurrence in Patients with Atrial Fibrillation. In *Heart Rhythm Society 2008*.
- 102. R.S. Oakes, T.J. Badger, M. Daccarett, C.J. McGann, J.J.E Blauer, E.V.R DiBella, E.G. Kholmovski, R.S. MacLeod, and N.F. Marrouche, MD. Use of Contrast Enhanced Magnetic Resonance Imaging to Identify Myocardial Healing Following Ablation for Atrial Fibrillation. In *Heart Rhythm Society 2008*.
- 103. RS. Oakes, N.M. Segerson, T.J. Badger, J.J.E. Blauer, E.G. Kholmovski, S. Vijayakumar, E.V.E. DiBella, R.S. MacLeod, and N.F Marrouche. Left atrial fibrosis impacts lesion formation during catheter ablation of atrial fibrillation. In *Heart Rhythm Society 2008*.
- 104. C. McGann, E. DiBella, B. Wilson, E. Kholmovski, R.S. MacLeod, N. Segerson, M. Daccarett, D. Parker, J. Windfelder, N. Marrouche. MRI to Detect and Follow Regression of Left Atrial Appendage Thrombus, In *Amer Coll Cardiol*, Chicago; 2008.
- 105. X. Tricoche, R.S. MacLeod, and C.R. Johnson. Visual Analysis of Bioelectric Fields. In *Proceedings of Visualization in Medicine and Life Sciences*, Springer Verlag, 2007 (in press).
- 106. J.G. Stinstra, M. Jolley, M. Callahan, D.M. Weinstein, M. Cole D.H. Brooks, J.K. Triedman, R.S. MacLeod. Evaluation of different meshing algorithms in the computation of defibrillation thresholds in children. *Proc IEEE Eng Med Biol Soc* 2007:1422-5, 2007.
- 107. A. Ghodrati, D.H. Brooks and R.S. MacLeod. Methods of solving reduced lead systems for inverse electrocardiography. *Proc IEEE Eng Med Biol Soc* 54(2):339-43, 2007.
- 108. A. Ghodrati, D.H. Brooks and R.S. MacLeod. Wavefront-based models for inverse electrocardiography. *Internat. Congress on Electrocardiol.* 2007.
- 109. Z. Engelman and R.S. MacLeod. Ventricular Repolarization in an Acute Canine Model of Pharmacologically Induced Long QT Syndrome. *Internat. Congress on Electrocardiol.* 2007.
- 110. S. Shome and R.S. MacLeod. Characterization of the transmural myocardial electrocardiographic response in in-vivo canine working hearts under reduced flow and increased heart rate *Internat. Congress on Electrocardiol.* 2007.
- 111. M. Jolley, J.G. Stinstra, D.M. Weinstein, S. Pieper, R. San Jose Estepar, F. Cecchin, D.H. Brooks, R.S. MacLeod, J.K. Triedman. Finite Element Modeling of Novel Defibrillation Approaches in Children and Adults. *Proceedings of the Heart Rhythm Socieity Congress*, 2007.
- 112. J.G. Stinstra, S. Roberts, J. Pormann, R.S. Macleod, and C. Henriquez. A Model of 3D Propagation in Discrete Cardiac Tissue. *Comput. in Cardiol* 33:41-44, 2006.
- 113. R.S. MacLeod, Y. Birnbaum, V. Shusterman, and M. Malik. Markers of impaired repolarization. *Proceedings of the International Congress on Electrocardiology*, 2006.

- 114. M. Jolley, J.K. Triedman, C.F. Westin, D.M. Weinstein, R.S. Macleod, and D.H. Brooks. Image Based Modeling of Defibrillation in Children. *Proceedings of 28rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2564–2567, 2006.
- 115. B. Yilmaz and R.S. Macleod. Instance Selection for Estimation of Epicardial Activation Sequence from Venous Catheter Measurements *Proceedings of 28rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 3982–3985, 2006.
- 116. L. Lorenzo, R.S. MacLeod, R.T. Whitaker, G. Adluru, and E.V.R. DiBella. Level sets and shape models for segmentation of cardiac perfusion MRI. Proc. SPIE Int. Soc. Opt. Eng. 6144, 614445 (2006)
- 117. B. Yilmaz and R.S. MacLeod. General Purpose Training Set Selection for Estimation of Epicardial Activation Sequence from Venous Catheters. EUSIPCO, 2005.
- 118. R.S. MacLeod. Ischemia-induced ST changes and arrhythmic risk. *Internat. Congress on Electrocardiology*, 2005.
- 119. R.S. MacLeod and D.H. Brooks. Quantitative Electrocardiography: two Steps Forward and One Step Back. Plenary talk at *Noninvasive Functional Source Imaging*, 2005.
- 120. F. Calderero, A. Ghodrati, D.H. Brooks, G. Tadmor, and R. MacLeod. A Method to Reconstruct Activation Wavefronts Without Isotropy Assumptions Using a Level Sets Approach. *Functional Imaging and Modeling of the Heart*, 2005.
- 121. B. Yilmaz and R.S. MacLeod. Venous Catheter Based Mapping of Epicardial Ectopic Activation. Proceedings of 26rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 1002–1005, 2004.
- 122. D.H. Brooks, A. Ghodrati, Y. Zhang, G. Tadmor, and R.S. MacLeod. Inverse electrocardiography in the framework of dynamic imaging problems. *Proceedings of 26rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 3565– 3568, 2004.
- 123. S. Shome, J.G. Stinstra, B. Hopenfeld, B. Punske, and R.S. MacLeod. A Study of the Dynamics of Cardiac Ischemia using Experimental and Modeling Approaches. *Proceedings* of 26rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2004.
- 124. J.G. Stinstra, B. Hopenfeld, and R.S. MacLeod. Using Models of the Passive Cardiac Conductivity and Full Heart Anisotropic Bidomain to Study the Epicardial Potentials in Ischemia. *Proceedings of 26rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2004.
- 125. C.H. Wolters, A. Anwander, B.Maess, R.S. MacLeod, and A.D. Friederici. The Influence of Volume Conduction Effects on the EEG/MEG Reconstruction of the Sources of the Early Left Anterior Negativity. *Proceedings of 26rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2004.

- 126. D.H. Brooks, A. Ghodrati, Y. Zhang, G. Tadmor and R.S. MacLeod. Inverse Electrocardiography in the Framework of Dynamic Imaging Problems. *Proceedings of 26rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2004.
- 127. R.S. MacLeod, D.M. Weinstein, C.R. Johnson, B.B. Punske, and B. Taccardi. SCIRun/BioPSE and Andy: Integrating problem solving environments and Phantoms in electrocardiographic inverse problems. *SIAM Conference on the Life Sciences*, 2004.
- 128. R.S. MacLeod D.M. Weinstein, J. Davison de St. Germain, D.H. Brooks, C.R. Johnson, and S.G. Parker. SCIRun/BioPSE: Integrated problem solving environment for bioelectric field problems and visualization. In Int. Symp. On Biomed Imag., Arlington VA, April 2004.
- 129. A. Ghodrati, F. Calderero, D.H. Brooks, G. Tadmor, R.S. MacLeod. Level Set Algorithm for the Inverse Problem of Electrocardiography. In *The Thirty-Eighth Asilomar Conference on Signals, Systems, and Computers*, M.B. Matthews, Ed., 2004, pages ??. IEEE Press.
- D.H. Brooks, Y. Serinağaoğlu, and R.S. MacLeod. Combining numerical and physiological constraints in inverse electrocardiography. Proceedings of the XXXth Congress on Electrocardiology. J. Bioelectromag. 5(1), 2003.
- 131. R.S. MacLeod, B.B. Punske, S. Shome, E. Di Bella, J. Stinstra, and B. Taccardi. Ischemia measurements in conjunction with simultaneous MRI studies. Proceedings of the XXXth Congress on Electrocardiology. J. Bioelectromag. 5(1), 2003.
- 132. D.M. Weinstein, J. Tranquillo, C. Henriquez, R.S. MacLeod, and C.R. Johnson. BioPSE Case Study: Modeling, Simulation, and Visualization of Three Dimensional Mouse Heart Propagation. Proceedings of the XXXth Congress on Electrocardiology. J. Bioelectromag. 5(1), 2003.
- 133. Y. Serinagaoglu, D.H. Brooks, and R.S. MacLeod. Bayesian approach to inclusion and performance analysis of using extra information in bioelectric inverse problems. IEEE International Conference on Image Processing, Vol 1, 1089–1092, 2003.
- 134. B. Taccardi, B.B. Punske, R.S. MacLeod, Q. Ni. Visualization, analysis and physiological interpretation of three-dimensional cardiac electric fields. Proceedings of 24th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, page 1366-1367, 2002.
- 135. Y. Serinağaoğlu, D.H. Brooks, and R.S. MacLeod. Bayesian Approaches to Include Sparse Noisy Measurements of Epicardial Potentials into Inverse Electrocardiography. Proceedings of 24th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2002.
- 136. R.S. MacLeod, E.D. DiBella, B.B. Punske, and E.K. Jeong. Multimodal imaging of cardiac activation, perfusion, and ischemia. 14th Annual Research Symposium of the Medical Imaging Research Laboratory, 2002.

- 137. Y. Serinagaoglu, D.H. Brooks, and R.S. MacLeod, Enhancing inverse electrocardiography with sparse noisy measurements of epicardial potentials. Int. Conf. on Bioelectromagnetism, 2002 and Int. Journal of Biolecetromagnetism, 4:89-90, 2002.
- 138. R.S. MacLeod. Estimation, Approximation, and Interpolation in Three-Dimensional Cardiac Bioelectric Field Mapping. Whitaker Foundation Conference, San Diego, 2002.
- 139. R.S. MacLeod, B. Yilmaz, Bruno Taccardi, Bonnie B. Punske, Yeşim Serinağaoğlu, and Dana H. Brooks. Direct and inverse methods for cardiac mapping using multielectrode catheter measurements. Noninvasive Functional Source Imaging Conference, 2001. *Biomed. Technik*, 46(supp): 207–208, 2001.
- 140. B. Taccardi, B.B. Punske, R.S. MacLeod, and Q. Ni. Extracardiac effects of myocardial electrical anisotropy. Noninvasive Functional Source Imaging Conference, 2001. *Biomed. Tech.* 46(suppl 2): 216–218, 2001.
- 141. B. Yilmaz, R.S. MacLeod, S. Shome, B.B. Punske, and B. Taccardi. Minimally Invasive Epicardial Activation Mapping from Multielectrode Catheters. Proceedings of 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2001.
- 142. S. Gumhold, X. Wang, and Rob MacLeod. Feature Extraction from Point Clouds. 2001 Meshing Roundtable Conference.
- 143. R.S. MacLeod, Q. Ni, B. Yilmaz, and D.H. Brooks. Statistical Estimation and Wave Equation Based Interpolation of Cardiac Potentials. 2001 SIAM Annual Meeting, San Diego, CA, 2001.
- 144. R.S. MacLeod, R. Kuenzler, Q. Ni, B. Taccardi, R.L. Lux. Epicardial mapping from intracoronary catheters. XXVIIth International Congress on Electrocardiology. Abstract Book, p.10, 2000.
- 145. B. Taccardi, B.B. Punske, R.S. MacLeod, T.J. Dustman. Recovery sequence, activationrecovery intervals and recovery potentials as affected by myocardial architecture. *Japan & Italy Conference on Arrhythmias*. Abstract Book, 2000.
- 146. B.P. Punske, R.L. Lux, R.S. MacLeod, P.R. Ershler, T.J. Dustman, Y. Vyhmeister, and B. Taccardi. Effects of recording reference on the 3-D potential distribution and shape of the unipolar electrograms: an experimental study. Proceedings of the Biomedical Engineering Society 2000 Annual Fall Meeting, *Annals of Biomed Eng.*, 28 (Supp):T6.22, 2000.
- 147. B.P. Punske, Q. Ni, R.L. Lux, R.S. MacLeod, P.R. Ershler, T.J. Dustman, Y. Vyhmeister, and B. Taccardi. Alternative methods of excitation time determination on the epicardial surface. Proceedings of The World Congress on Biomedical Engineering, 2000.
- 148. Q. Ni, R.S. MacLeod, R.L. Lux, and B. Taccardi. Estimation of three dimensional electric potential fields in the heart. Proceedings of The First Joint BMES/EMBS Conference, page 1190, 1999.

- 149. K.G. Shrinidhi, D.H. Brooks, and R.S. Macleod. Imposition of frequency domain constraints in inverse electrocardiography. Proceedings of The First Joint BMES/EMBS Conference, page 277, 1999.
- 150. B.P. Punske, R.L. Lux, R.S. MacLeod, P.R. Ershler, T.J. Dustman, Y. Vyhmeister, and B. Taccardi. Experimental study and removal of the drift of the reference potential from the unipolar electrogram. Proceedings of The First Joint BMES/EMBS Conference, page 303, 1999.
- 151. D.H. Brooks, K.G. Srinidhi, and R.S. MacLeod, Wavefront preserving admissible solutions for inverse electrocardiography, presented special session of the Biomedical Engineering Society Annual Meeting, Cleveland, OH, abstract CB.22 in *Ann. Biomed. Eng.*, vol. 26 suppl, p. S-51, Sept.-Oct. 1998.
- 152. B.B. Punske, R.L. Lux, M.S. Fuller, P.R. Ershler, R.S. MacLeod, T.J. Dustman, Y. Vyhmeister, B. Taccardi. What determines QT interval distribution and duration? American Heart Association 71st Scientific Sessions, 1998.
- 153. R.S. MacLeod, Q. Ni, R.O. Kuenzler, D.H. Brooks, B. Taccardi, and R.L. Lux. Spatiotemporal Analysis of Cardiac Electrical Activity. In *The Thirty-Second Asilomar Conference on Signals, Systems, and Computers*, M.B. Matthews, Ed., 1998, pages 309–313. IEEE Press.
- 154. R.S. Macleod, R.O. Kuenzler, B. Taccardi, and R.L. Lux. Estimation of Epicardial Activation Maps from Multielectrode Venous Catheter Measurements. *PACE*, 21(4):595, 1998.
- 155. R.S. MacLeod, R.L. Lux, B. Taccardi. S. Kadagattur, and D.H. Brooks. Detection and localization of cardiac repolarization changes: Experimental and modeling studies. Noninvasive Functional Source Imaging Conference, 1997. *Biomediz. Technik.* 42(suppl), 1997.
- 156. R. Hren, R.S. MacLeod, G. Stroink, and B.M. Horacek. Assessment of spatial resolution of body surface potentials maps in localizing ventricular tachycardia foci. Noninvasive Fucntional Source Imaging Conference. *Biomediz. Technik.* 42(suppl): 41–44, 1997.
- 157. Q. Ni, R.S. MacLeod, R.L Lux, and B. Taccardi. Interpolation of cardiac electric potentials. *Ann. Biomed. Eng.* 25 (suppl.):61. 1997 BMES Annual Fall Meeting.
- 158. E. Penades, W. O'Connel, R.S. MacLeod, M. Dae and M.D. Lesh. Visualization of radionuclide imaging and activation recovery intervals on the epicardial surface. In *IEEE Engineering in Medicine and Biology Society 17th Annual International Conference*, 1997.
- 159. T. Oostendorp, R.S. Macleod, and A. van Oosterom. Non-invasive determination of the activation sequence of the heart: Validation with invasive data. In *IEEE Engineering in Medicine and Biology Society 17th Annual International Conference*, 1997.
- 160. D.H. Brooks, H. Krim, J.C. Pesquet, and R.S. MacLeod. Best basis segmentation of ECG signals using novel optimality criteria. In *Proceedings of ICASSP*, pages 2750-2753, 1996.

- 161. R.S. MacLeod, B. Taccardi, and R.L. Lux. Electrocardiographic mapping in a realistic torso tank preparation. In *IEEE Engineering in Medicine and Biology Society 17th Annual International Conference*, pages 245–246, 1995.
- 162. G.F. Ahmad, D.H. Brooks, C.A. Jacobson, and R.S. MacLeod. Constraint evaluation in inverse electrocardiography using convex optimization. In *IEEE Engineering in Medicine* and Biology Society 17th Annual International Conference, pages 209–210, 1995.
- 163. D.H. Brooks, R.V. Chary, H. Krim, H. On, and R.S. MacLeod. Wavelet-based temporal segmentation and analysis of body surface potential maps during PTCA-induced ischemia. In *IEEE Engineering in Medicine and Biology Society 17th Annual International Conference*, pages 209–210, 1995.
- 164. R.N. Klepfer, C.R. Johnson, and R.S. MacLeod. The effects of inhomogeneities and anisotropies on electrocardiographic fields: A three-dimensional finite elemental study. In *IEEE Engineering in Medicine and Biology Society 17th Annual International Conference*, pages 209– 210, 1995.
- 165. R.S. MacLeod, B. Taccardi, and R.L. Lux. Mapping of cardiac ischemia in a realistic torso tank preparation. In *Building Bridges: International Congress on Electrocardiology International Meeting*, pages 76–77, 1995.
- 166. J.A. Schmidt, C.R. Johnson, and R.S. MacLeod. An interactive computer model for defibrillation device design. In *Building Bridges: International Congress on Electrocardiology International Meeting*, pages 160–161, 1995.
- 167. G. Ahmad, D.H. Brooks, C. Jacobson, and R.S. MacLeod. A feasibility study of inverse electrocardiography by convex optimization. In 21st Northeast Bioengineering Conference, 1995.
- D.M. Davenport, D.H. Brooks, and R.S. MacLeod. Experimentally derived realistic constraints on epicardial potential distributions. In 21st Northeast Bioengineering Conference, 1995.
- D.H. Brooks, G. Ahmad, and R.S. MacLeod. Multiply constrained inverse electrocardiology: Combining temporal, multiple spatial, and iterative regularization. In *IEEE Engineering in Medicine and Biology Society 16th Annual International Conference*, pages 137–138, 1994. IEEE Press.
- 170. D.H. Brooks, H. On, and R.S. MacLeod. Spatio-temporal wavelet analysis of body surface potential maps during PTCA-induced ischemia. In *IEEE Engineering in Medicine and Biology Society 16th Annual International Conference*, pages 1208–1209, IEEE Press, 1994.
- 171. D.H. Brooks and R.S. MacLeod. Imaging the electrical activity of the heart: direct and inverse approaches. In *First Annual IEEE International Conference on Image Processing*, pages 137–138, IEEE Press, 1994.

- 172. D.H. Brooks, H. On, and R.S. MacLeod. Multidimensional multiresolution analysis of array ECG signals during PTCA procedures. In *IEEE Symposium on Time-Frequency and Time-Scale Conference*, pages 552–555, IEEE Press, 1994.
- 173. D.H. Brooks, R.S. MacLeod, and H. Krim. Analysis of changes in body surface potentials during PTCA-induced ischemia using the temporal wavelet transform. In *Computers in Cardiology*, pages 329–332. IEEE Press, 1994.
- 174. R.S. MacLeod, B. Taccardi, and R.L. Lux. The influence of torso inhomogeneities on epicardial potentials. In *Computers in Cardiology*, pages 793–796. IEEE Press, 1994.
- 175. H. On, D.H. Brooks, R.S. MacLeod, and H. Krim. Multiresolution analysis of PTCA isopotential maps. In 20th Northeast Bioengineering Conference, pages 3–6, 1994.
- 176. G. Ahmad, D.H. Brooks, G.M. Maratos, and R.S. MacLeod. Joint energy and Laplacian regularization in inverse electrocardiography. In *20th Northeast Bioengineering Conference*, pages 59–61, 1994.
- 177. F. Kornreich, R.S. MacLeod, G. Van Herpen, and V. Dzavik. Body surface potential mapping of QRST changes during and after percutaneous transluminal coronary angioplasty. In *Computers in Cardiology*, pages 297-300. IEEE Press, 1993.
- 178. R.S. MacLeod, R.L. Lux, and B. Taccardi. Translation of body surface maps between different electrode configurations using a three-dimensional interpolation scheme. In *Proceedings* of the International Committee on Electrocardiology, XXth Annual Meeting, P.W. Macfarlane, editor, pages 179–182, 1993.
- 179. R.S. MacLeod and C.R. Johnson. Map3d: Interactive scientific visualization for bioengineering data. In *IEEE Engineering in Medicine and Biology Society 15th Annual International Conference*, pages 30–31, IEEE Press, 1993.
- 180. C.R. Johnson and R.S. MacLeod. High performance computing in medicine: Direct and inverse problems in cardiology. In *IEEE Engineering in Medicine and Biology Society 15th Annual International Conference*, pages 582–583, IEEE Press, 1993.
- 181. B. Taccardi, R.L. Lux, P.R. Ershler, R.S. MacLeod, and Y. Vyhmeister. Effect of myocardial anisotropy on the body surface potential distributions. In *Proceedings of the International Committee on Electrocardiology XXth Annual Meeting*, 1993.
- 182. D.H. Brooks, G.M. Maratos, G. Ahmad, and R.S. MacLeod. The augmented inverse problem of electrocardiography: combined time and space regularization. In *IEEE Engineering in Medicine and Biology Society 15th Annual International Conference*, pages 773–774, IEEE Press, 1993.
- 183. C.R. Johnson, R.S. MacLeod, and A. Dutson. Effects of anisotropy and inhomogeneity on electrocardiographic fields: a finite element study. In *IEEE Engineering in Medicine and Biology Society 14th Annual International Conference*, pages 2009–2010. IEEE Press, 1992.

- 184. R.S. MacLeod, C.R. Johnson, and M.A. Matheson. Visualization of cardiac bioelectricity—a case study. In *IEEE Visualization 92*, pages 411–418, 1992.
- 185. R.S. MacLeod, C.R. Johnson, and M.A. Matheson. Visualization tools for computational electrocardiography. In *Visualization in Biomedical Computing*, pages 433–444, 1992.
- 186. R.S. MacLeod, C.R. Johnson, M.J. Gardner, and B.M. Horáček. Localization of ischemia during coronary angioplasty using body surface potential mapping and an electrocardiographic inverse solution. In *Computers in Cardiology*, pages 251–254. IEEE Press, 1992.
- 187. B. Taccardi, R.R. Lux, P.R. Ershler, R.S. MacLeod, and Y. Vyhmeister. Potential distributions and excitation time maps recorded with high spatial resolution from the entire ventricular surface of exposed dog hearts. *Computers in Cardiology*, pages 1–4. IEEE Press, 1992.
- 188. B. Taccardi, R.L. Lux, P.R. Ershler, R.S. MacLeod, and Y. Vyhmeister. Effect of myocardial fiber direction on 3-D shape of excitation wavefronts and associated potential distributions in ventricular walls. *Circ.* (Suppl. I):I-752, 1992.
- 189. B. Taccardi, R.L. Lux, P.R. Ershler, R.S. MacLeod, and Y. Vyhmeister. Newer data on epicardial electrical activity. In *Third Annual Meeting of the Biomedical Engineering Society, Salt Lake City, Utah* F.1.4, 1992.
- 190. R.S. MacLeod, C.R. Johnson, and P.R. Ershler. Construction of an inhomogeneous model of the human torso for use in computational electrocardiography. In *IEEE Engineering in Medicine and Biology Society 13th Annual International Conference*, pages 688–689. IEEE Press, 1991.
- 191. C.R. Johnson and R.S. MacLeod. Nonuniform spatial mesh adaption using *a posteriori* error estimates: application to forward and inverse problems in electrocardiology, In *Proceedings* of the Workshop on Adaptive Methods for Partial Differential Equations, 1992.
- 192. C.R. Johnson and R.S. MacLeod. Computer models for calculating transthoracic current flow. In *IEEE Engineering in Medicine and Biology Society 13th Annual International Conference*, pages 768–769. IEEE Press, 1991.
- 193. C.R. Johnson and R.S. MacLeod. Computer models for calculating electric and potential fields in the human thorax. *Annals of Biomed. Eng.*, page 620, 1991.
- 194. R.S. MacLeod, M.J. Gardner, R.G. MacDonald, M.A. Henderson, R.M. Miller, and B.M. Horáček, Validation of an electrocardiographic inverse solution using percutaneous transluminal coronary angioplasty. In *IEEE Engineering in Medicine and Biology Society 12th Annual International Conference*, pages 533–534. IEEE Press, 1990.
- 195. R.S. MacLeod, B.M. Horáček, and M.J. Gardner. Hochauflösende EKG-Mapping-Verfahren für Untersuchungen während der Koronardilitation. In *Biomedizinische Technik – 15. Jahresta*gung der Österreichischen Gesellschaft für Biomedizinische Technik, Innsbruck, Austria, 1990.

- 196. R.S. MacLeod, M.J. Gardner, and B.M. Horáček. Body surface mapping of angioplastyinduced ischemia. *J. Mol. & Cell. Cardiol.* 22 Suppl., page S86. International Society for Heart Research, XI European Meeting, Glasgow, United Kingdom, 1990.
- 197. R.S. MacLeod, B.K. Hoyt, P.J. MacInnis, R.V. Potter, and B.M. Horáček. A body surface potential mapping unit for recording during coronary angioplasty. In *IEEE Engineering in Medicine and Biology Society 10th Annual International Conference*, pages 97–98. IEEE Press, 1988.
- 198. H. Windisch, W. Müller, H.A. Tritthart, H. Hagauer, and R.S. MacLeod. Photometric measurements of the rising phase of cardiac action potentials. In *International Union of Pure and Applied Biophysics and the Royal Society of London, 8th International Biophysics Congress*, 1984.
- 199. H. Windisch, W. Müller, H.A. Tritthart, H. Hagauer, and R.S. MacLeod. Photometrische Messung der Depolarisationsphase von Aktionspotentialen von Herzmuskelgeweben. In *Jahrestagung 1984 der Österreichischen Physikalischen Gesellschaft*, 1984.
- 200. H. Windisch, W. Müller, R.S. MacLeod, H. Hagauer, and H.A. Tritthart. Measurement of rapid changes in membrane potentials in heart muscle using potential sensitive dyes. In 9th Meeting of the Working Group on Cardiac Cellular Electrophysiology, 1985.
- R.K. Helppi, R.S. MacLeod, and B.M. Horáček. Modular software for the processing of cardiac signals. In *Computers in Cardiology International Conference*, pages 367–368. IEEE Press, 1979.

Oral Presentations

- 1. *The State of ECGI: A Big Space of Motivating Challenges* Consortium or ECG Imaging, Satellite Meeting, September, 2022.
- 2. *The Physiological Underpinnings of Acute Myocardial Ischemia* International Society of Computerized Electrocardiography, April, 2022.
- 3. *State of the Art in EGC Imaging* Invited presentation at the 2021 International Congress on Electrocardiology, Virtual, May, 2021.
- 4. Is that really Electricity that Makes our Hearts Beat and our Brains Think? Invited presentation in the BIOEN Current Research Series, University of Utah January, 2020.
- 5. *State of the Art in ECG Imaging Trends and Future Directions* Invited presentation at the 2019 International Society of Electrocardiology Conference, Belgrade, Serbia, June 2019.
- 6. *Present and future of body surface mapping* Invited presentation at the 2019 International Society of Computerized Electrocardiology Conference, Atlantic Beach, FL, April, 2019.
- 7. What Happens When You Overdraw on Your Metabolic Bank Account? Myocardial Ischemia and Heart Attacks. Invited presentation at the Osher Lecture Series, University of Utah, February, 2019.
- 8. *ECG Imaging and Computational ECG* Invited presentation at the 2018 International Society of Electrocardiology Conference, Chiba City, Japan, June 2018.
- 9. *Computational ECG in Acute Ischemia* Invited presentation at the 2018 International Society of Electrocardiology Conference, Chiba City, Japan, June 2018.
- 10. Cardiac Electrophysiology Simulations: Connecting Models, Images and Certainty to Clinical Care Invited presentation at Philips Healthcare, Eindhoven, The Netherlands, June, 2018.
- 11. *Image Based Analysis and Modeling in Heart Disease* Invited presentation at the University of Bologna, Cesena, Italy, May, 2018.
- 12. ECG Detection of Acute Ischemia: Time to Bury Old Dogma and Take a Fresh Look Cardiology Grand Rounds, University of Maastricht, The Netherlands, May, 2018.
- 13. *How to Deal with A Broken Heart and Appreciate a Healthy One* Invited presentation at the Osher Lecture Series, University of Utah, February, 2018.
- 14. *How I Found a Dream Job—and You Can too* Invited presentation in the BIOEN Current Research Series, University of Utah January, 2018.
- 15. *Imaging and Mapping Research for AF* Invited presentation at Atrial Fibrillation Signals 2017, October 2017 in Valencia, Spain.

- 16. Teaching Communications Skills to Undergraduate and Graduate Students of Biomedical Engineering at the University of Utah: A Genre Acquisition and Apprenticeship Approach Invited presentation at the Biomedical Engineering Society Conference, October 2017 in Phoenix, AZ.
- 17. *Myocardial Ischemia and its ECG Signature: 100 years of Forgery?* Invited presentation at the STAFF 2017, September 2017 in St. Malo, France.
- 18. *Myocardial Ischemia and its ECG Signature: 100 years of Forgery?* Invited presentation at International Congress on Electrocardiology 2017, June 2017 in Portland, OR.
- 19. *Integrated Software Infrastructure for Image Based Modeling* Invited presentation at Workshop on Mathematical methods in cardiac electrophysiology, November 2017 in Ottawa, Canada.
- 20. Early ECG Markers of Nontransmural Myocardial Ischemia Invited presentation at International Congress on Electrocardiology (ICE) June 4-6, 2016 in Palma, Balearic Island, Spain.
- 21. A Collaborative Approach to Solving Complex Problems in ECG Imaging Invited presentation at the Universitat de Valencia, Valencia, Spain. June 1, 2016.
- 22. Integrating engineers and clinicians in cardiovascular disease: challenges and opportunities Invited presentation at FiCE 2016 workshop: "Electrocardiographic Imaging and Image Integration", Maastricht, The Netherlands, 2016.
- 23. Visions of Imaging and Mapping Invited presentation at AF Signals, Karlsruhe, Germany, October 2015.
- 24. *Role of Imaging, Modeling, and Simulation in Management of Cardiac Arrhythmias.* Invited presentation at Dalhousie University Medical Reunion, Nova Scotia, Canada, August, 2015.
- 25. *The time is right: ECG Inverse solutions in research and clinical practice* Invited presentation and the International Society of Computerized Electrocardiology, San Jose, CA, April 2015.
- 26. *Validation and verification: new opportunities and old requirements* Plenary presentation at the First ECG-Imaging Workshop, Bad-Herrenalb, Germany, March, 2015.
- 27. *Propagation Modeling in Context: Applications and Infrastructure* Invited presentation at the Large Scale Modeling of Cardiac Electrophysiology A Critical Look at the past, present, and future of a discipline, Halifax, Nova Scotia, June 2014.
- 28. *Inverse Solutions in Electrocardiography: an Old Problem is Getting New Attention* Invited presentation at the International Society of Computerized Electrocardiology, in Jacksonville, FL, Apr, 2014.
- 29. *The Shape of Things to Come in AF Imaging* Invited presentation at the Western Atrial Fibrillation 2014 in Park City, UT, March, 2014.

- 30. *Image Based Modeling and Simulation in Cardiac Electrophysiology* Invited presentation at the Karl-Franzens University of, Graz, Austria, October, 2013.
- 31. *Image Based Modeling for Heart and Brain Bioelectricity* Invited presentation at the University of Muenster, Muenster, Germany, October, 2013.
- 32. *Image Based Analysis and Modeling in Cardiac Electrophysiology* Invited presentation at the University of Maastricht, Maastricht, The Netherlands, October, 2013.
- 33. Open Source Software Solutions for Image Processing and Image Based Modeling in Cardiac Electrophysiology Invited presentation at the Karlsruhe Institute of Technology in Karlsruhe, Germany, September, 2013.
- 34. Open Source Software Solutions for Image Processing and Image Based Modeling in Cardiac Electrophysiology Invited presentation at the Universitat Pompeu Fabra (UPF) in Barcelona, Spain, September, 2013.
- 35. *Image Based Modeling: Segmentation and Problem Solving Environments* Invited presentation at the INRIA Sophia Antipolis, France, September, 2013.
- 36. *The Role of Fibrosis and Morphology in Patient Based Simulation of Atrial Fibrillation*. Invited presentation at the International Congress on Electrocardiology in Glasgow, Scotland, August, 2013.
- 37. *Imaging and modelling of atrial morphology and fibrosis in atrial fibrillation patients*. Invited presentation at the Atrial Fibrillation: Clinical Challenges for Biophysical Modelling, in London, UK, June 2013.
- 38. *Patient-specific Models: Computational Pipeline for the Arrhythmia Simulation*. Invited presentation the Heart Rhythm Society Annual Scientific Sessions, May 2013.
- 39. The Scientific Computing and Imaging Institute at the University of Utah: Overview, Imagebased Modeling, Simulation and SCIRun. Invited presentation at the 11th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, April, 2013.
- 40. *Image Analysis in AF: Not Just a Utah Story*, Invited presentation at the 2013 Western Atrial Fibrillation Symposium, 2013. Park City, Utah, March, 2013. (Co-chair of the symposium).
- 41. Image Based Modeling of Atrial Arrhythmias Towards Personalized Clinical In-Silico Modeling of Atrial. Invited presentation at the 2012 Cardiac Physiome Workshop, November, 2012.
- 42. *Software tools for Image Based Modeling, Simulation, and Visualization*. Director of Workshop at EMBC, October, 2012.
- 43. *Crossing the valley of death: Taking engineering to the Cardiac bedside*. Invited presentation at Kings College London September 12, 2012.
- 44. *Crossing the valley of death: Taking engineering to the Cardiac bedside*. Invited presentation at John Hopkins University ICM Distinguished Seminar Series, September 3, 2012.

- 45. Subject Specific, Image Based Analysis and Modeling in Patients with Atrial Fibrillation from MRM. Invited presentation at International Society of Biomedical Imaging (ISBI), 2012.
- 46. *Cardiac Delayed-Enhancement Magnetic Resonance Image Segmentation (cDEMRIS)* Presenters: K. Rhode, R. Karim, R.S. MacLeod, J. Cates, and D. Peters. Image Processing Challenge, at International Society of Biomedical Imaging (ISBI), 2012.
- 47. *Image-based Management of Atrial Fibrillation* Invited plenary presentation at the NCRR/NIBIB P41 PI's Meeting, 2012. Bethesda, MD, March, 2012.
- 48. *Role of Image Processor in Managing AF*. Invited presentation at the 2012 Western Atrial Fibrillation Symposium, 2012. Park City, Utah, February, 2012. (Co-chair of the symposium).
- 49. *Medical Imaging in Personalized Health Care*. Invited plenary presentation at the Personalized Healthcare Penalized Healthcare 2012, University of Utah, 2012.
- 50. Use of imaging in AFib and development of image based approaches for all aspects of patient management Invited plenary presentation at International Congress on Electrocardiology, Kjngston, Ontario, Canada, June, 2011.
- 51. *Inverse Problems in Electrocardiography* Invited expert presentation at MEDCAC Meeting 11/9/2011 The Use of ECG Based Signal Analysis Technologies to Detect Myocardial Ischemia or Coronary Artery Disease. Baltimore, MD, November, 2011.
- 52. *MR imaging and atrial fibrillation* Invited presentation at NHLBI/VCU-World Congress on Mathematical Modeling and Computational Simulation of Cardiovascular and Cardiopulmonary Dynamics, June 2011.
- 53. *Imaging and Modeling in Atrial Fibrillation: An Engineer's Garden* Invited Minisymposium plenary at Functional Imaging and Modeling of the Heart, May, 2011.
- 54. *Image Based Modeling, Simulation, and Visualization in Biomedicine* Invited workshop at the NIH, NCRR Third Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE), June, 2010.
- 55. Imaging and Image Processing in the Comprehensive Management of Patients with Atrial Fibrillation: the CARMA Approach Invited keynote address at International Congress on Electrocardiology, Lund, Sweden, June, 2010.
- 56. *How to SCI in Utah with good CARMA: Image Based Science in Cardiac Electrophysiology* Invited seminar at Simula Research Laboratory, Oslo, Norway, June, 2010.
- 57. *Real-Time MRI imaging in the EP lab: from the Engineering point of view* Invited presentation at the Update on Atrial Fibrillation 2010, Coburg, Germany, April, 2010.
- 58. *Image Analysis for MRI Supported AF Management* Invited presentation at Western Atrial Fibrillation Symposium, Park City, Utah, February, 2010.

- 59. Lest we forget-the Clinical Expectations and Requirements for Useful Simulation of Cardiac Bioelectricity Invited presentation at the World Congres on Medical Physics and Biomedical Engineering, Munich, Germany, September 10, 2009.
- 60. Lest we forget-the Clinical Expectations and Requirements for Useful Simulation of Cardiac Bioelectricity Invited presentation at the Applied Inverse Problems Conference, Vienna, Austria, July 22, 2009.
- 61. *Simulation of Defibrillation: A Little Math Goes a Long Way* Invited presentation at the Institute of Mathematics and Scientific Computing, University of Graz, Austria, July 2, 2009.
- 62. *New Reasons for Doctors to Like Imaging: Applications in Cardiology and Neurology* Invited presentation at the Institute for Biomagnetism and Biosignalanalysis University of Muenster, Muenster, Germany, June 29, 2009.
- 63. *New Reasons for Doctors to Like Imaging: Applications in Cardiology and Neurology* Invited presentation at the Rochester Institute of Technology, May 6, 2009.
- 64. Assessment of atrial fibrosis using MRI Invited presentation at the 12th traditional international Prague workshop on catheter ablation, Prague, Czech Republic, April, 2009.
- 65. *MRI Supported Management of Atrial Fibrillation* Invited presentation at the Siemens/Utah Research Symposium, Salt Lake City, February, 2009.
- 66. *Real Time MRI and Animal Experiments* Invited presentation at the 2nd Western Atrial Fibrillation Symposium, Park City, UT, December, 2008.
- 67. *Atrial Fibrillation: A Heart Beating to a Different Drum* Invited presentation at the Salt Lake City Library, November, 2008.
- 68. *Image Processing/Analysis in Atrial Ablation* Invited presentation at the Park City Institute, Park City, UT, July, 2008.
- 69. *Real-Time MRI imaging in the EP lab: from the Engineering point of view* Invited presenation at the Update on Atrial Fibrillation, Coburg, Germany, 2008.
- 70. *Novel use of MRI in Atrial Fibrillation: a Gold Standard?* Invited presentation at the International Society of Computerized Electrocardiology Conference, Riverside, CA, May, 2008.
- 71. An Interdisciplinary Approach to Scientific Computing, Imaging, and Visualization Invited presentation at NIH-LBI (VCU) short course on Computational Modeling Applications in Cardiopulmonary Dynamics, March, 2008.
- 72. *Two Short Stories of Bioelectric Fields and the Heart* R.S. Macleod. Division of Cardiology Grand Rounds, University of Utah, February, 2008.
- 73. *Simulation of Defibrillation: A Little Math Goes a Long Way* R.S. MacLeod. Applied Math seminar, Department of Mathematics, University of Utah, January, 2008.

- 74. *Image Processing/Analysis to Facilitate Atrial Ablation* R.S. MacLeod. Invited presentation at the Western Atrial Fibrillation Symposium, Park City, UT, December, 2007.
- 75. *Image Processing in Treating Atrial Fibrillation: One Challenging Problem After Another* R.S. MacLeod. Imaging seminar, Scientific Computing and Imaging Institute, University of Utah, December, 2007.
- 76. *Patient Specific Modeling of ICD Placement in Children* R.S. MacLeod. Division of Cardiology Research Rounds, Department of Pediatrics, University of Utah, September, 2007.
- 77. *Multimodal Imaging for Diagnosis and Treatment of Atrial Fibrillation* R.S. MacLeod. Plenary Talk at the Utah Center for Advanced Imaging Research Research Conferences. September, 2007
- 78. *Monitoring the Inside from the Outside* R.S. MacLeod. Invited presentation at Computers in Cardiology Conference, Sunday Symposium, September, 2007.
- 79. *Applications of Biomedical Computing in the Heart* R.S. MacLeod. NBCR Summer Institute Mini-Symposium, UCSD, San Diego. July, 2007.
- 80. *The Electrocardiology of Myocardial Ischemia* R.S. MacLeod. CVRTI Research in Progress Lecture Series, November, 2006.
- An Interdisciplinary Approach to Scientific Computing, Imaging, and Visualization R.S. MacLeod. Dalhousie University College of Engineering Invited Lecture Series, September, 2006.
- 82. *Mechanism for ST depression associated with contiguous subendorcardial ischemia* R.S. MacLeod, S. Shome, B.B. Punske, B. Hopenfeld, J.G. Stinstra, and B. Taccardi. International Congress of Electrocardiology 2006. Koeln, Germany (Invited presentation).
- 83. *Quantitative Electrocardiography: two Steps Forward and One Step Back.* R.S. MacLeod and D.H. Brooks. Noninvasive Functional Source Imaging, 2005. (Invited plenary presentation).
- 84. *Ischemia-induced ST changes and arrhythmic risk*. International Congress of Electrocardiology 2005. Gdansk, Poland. (Invited presentation).
- 85. *Epicardial Potentials Arising From Subendocardial Ischemia* First virtual visualization of the reconstructed electrocardiographic display symposium. Halle, Belgium, 2004.
- 86. *Bioelectric Field Computation: How Simple Problems Become Hard* at the Eleventh Biennial IEEE Conference on Electromagnetic Field Computation (CEFC 2004), Soeul, Korea, 2004.
- 87. *Mixing Computers, Engineering, Doctors, and Biologists: How to take the "I" out of Interdisciplinary* Plenary address at Computing in Medicine and Biology at Marquette University, March, 2004.

- 88. *Experimental Approaches in Myocardial Ischemia Imaging* at the Electrophysiology of Acute Ischemia and Infarction Workshop held in conjunction with the International Congress on Electrocardiology. Helsinki, Finnland, June 2003.
- 89. *Imposing Multiple Constraints in Electrocardiographic Inverse Problems* at Applied Inverse Problems: Theoretical and Computational Aspects, Lake Arrowhead, May, 2003.
- 90. *Inverse Bioelectric Field Problems: Modeling, Simulation, and Visualization*, Chris Johnson, Co-author, at Applied Inverse Problems: Theoretical and Computational Aspects, Lake Arrowhead, May, 2003.
- 91. *Multimodal Imaging of Cardiac Activation, Perfusion, and Ischemia* at the Medical Imaging Research Lab Research Conference, Sundance, Utah, 2002.
- 92. *Physiologic and Biochemical Basis of Myocardial Protection from Acute Ischemia and Infarction* at the Electrophysiology of Acute Ischemia and Infarction Workshop held in conjunction with the International Congress on Electrocardiology. Montreal, 2002.
- 93. *Estimation, Interpolation, and Modeling in Cardiac Mapping* Karfranzens Universität Graz, Austria, September, 2001.
- 94. Ischemia in the Electrolytic Torso Tank Department of Physiology, University of Parma, September, 2001.
- 95. *The Physiome Project* Scientific Computing and Imaging Institute, University of Utah, February, 2000.
- 96. *Electrocardiographic Imaging: Look Ma', No Rays* Medical Imaging Research Laboratory, University of Utah, September, 1999.
- 97. Computing Torso Current Fields using Finite Element ad Boundary Element Methods Scientific Computing and Imaging Institute, University of Utah, June, 1999.
- 98. *Statistical Signal Processing in Electrocardiology* Scientific Computing and Imaging Institute, University of Utah, December, 1998.
- 99. The Problem Solvers's Toolbox for Bioelectricity and Biomagnetism, Bioengineering Department, University of Utah, October, 1998.
- 100. *Inverse Problems in Cardiology* Department of Bioengineering, University of Utah, March, 1997.
- Evaluation of Measurement Methods for Detecting Heterogeneous Repolarization Division of Cardiology, Department of Internal Medicine, University of Utah, Salt Lake City, Utah. May, 1996.
- 102. Remote Sensing of Electrocardiographic Fields: Experimental and Modeling Approaches Department of Electrical and Computer Engineering, Northeastern University, September, 1995.
- 103. *The Heart as a Source of Electricity: "Current Thoughts"* Division of Cardiology, Department of Internal Medicine, University of Utah, Salt Lake City, Utah. February, 1994.
- 104. Applications of Inverse Solutions in Cardiology: Adventures in Mapping, Modeling, and Cardiology. Department of Bioengineering, University of Utah. February, 1993.
- 105. *Interpolation, a Mapper's Best Friend?* Division of Cardiology, Department of Internal Medicine, University of Utah, Salt Lake City, Utah. January, 1993.
- 106. The Forward and Inverse Problems of Electrocardiology: Electrostatics, Laplace Equation, Green's Theorem and some Nasty Numerics. Department of Physics, Dalhousie University, Halifax, Nova Scotia, Canada. October, 1992.
- 107. Interactive Visualization of Cardiac Bioelectricity. Utah Supercomputing Institute Visualization Workshop, Salt Lake City, Utah. May, 1992.
- 108. Noninvasive Detection of Acute Myocardial Ischemia During Coronary Angioplasty. Division of Cardiology, Department of Internal Medicine, University of Utah, Salt Lake City, Utah. January, 1992.
- 109. Von der Brust zur Herzoberfläche: eine Lösung des Rückwärtsproblems in der Elektrokardiographie. Institut für Biomedizinische Technik, Technische Universität Graz, Graz, Austria, June 1990.
- 110. Koronardilatation als Modell für Ischämie im Menschen. Institut für Medizinsche Physik und Biophysik, Universität Graz, Graz, Austria, June 1990.
- 111. *Computers in the medical workplace*. 3rd Annual AGM and Seminar of the Canadian Association of Cardio-Pulmonary Technologists, Halifax, Nova Scotia, 1988.
- 112. With H. Windisch, and W. Müller. *A refined system to detect cardiac spread of excitation by optical means*. Workshop on the Technical Aspects of Cardiac Mapping, Halifax, Nova Scotia, June 1987.
- 113. Body Surface Potential Mapping in der Elektrokardiographie. Institut für Medizinische Physik und Biophysik, Graz, Austria, 1987.

Diplomarbteit (Master's Thesis)

R.S. MacLeod. Signal Verzögerung in der Tontechnik – Entwicklung eines digitalen Verzögerungsgerätes mit Deltamodulatoren. Masters thesis, Technical Unversity of Graz, Graz, Austria, 1985.

Ph.D. Thesis

R.S. MacLeod. *Percutaneous Transluminal Coronary Angioplasty as a Model of Cardiac Ischemia: Clinical and Modelling Studies*. Dalhousie University, Halifax, N.S. Canada, 1990.