

## CURRICULUM VITAE

Last Updated: 09/08/2020

### RESEARCH INTERESTS

- Cardiac Electrophysiology
- Computational Electrophysiology
- Bioinformatics
- Adipocyte Biology
- Scientific Computing & Visualization
- Cardiac Device & Diagnostics

### EDUCATION

**Ph.D.** in Bioengineering, University of Utah, 2015

Advisor: Robert S. MacLeod

Committee Members: Alexey Zaitsev, Edward Hsu, Edward DiBella, Scott Youngquist

Dissertation: *Bioelectric Source Characterization of Acute Myocardial Ischemia*

**M.S.** in Computer Science & Engineering, University of Notre Dame, 2005

Advisor: Jesus A. Izaguirre

Dissertation: *Using Design Patterns in Scientific Applications*

**B.S.** in Computer Engineering Technology, Andrews University, 2000

### PROFESSIONAL EXPERIENCE

#### RESEARCH EXPERIENCE

**Postdoctoral Scientist**, Fall 2015 - present  
Efimov Lab, George Washington University

**Research Assistant**, Fall 2007 - Summer 2015  
Scientific Computing & Imaging Institute, University of Utah  
Cardiovascular Research & Training Institute, University of Utah

## TEACHING EXPERIENCE

**Guest Lecturer**, Fall 2015 - Fall 2018

Quantitative Physiology, Biomedical Engineering Department, George Washington University

**Teaching Assistant**, Spring 2009

Systems Physiology, Biomedical Engineering Department, University of Utah

**Mentor**, Spring 2011

Undergraduate Senior Project, Biomedical Engineering Department, University of Utah

## INDUSTRY EXPERIENCE

**Intellectual Property Manager**, Aug 2004 - Jun 2007

**Business Analyst**, Aug 2002 - July 2004

**Engineer**, Sep 2000 - July 2002

Whirlpool Corporation, Benton Harbor, Michigan

## PROFESSIONAL ACTIVITIES

### PROFESSIONAL MEMBERSHIP & SERVICE

- Member, American Heart Association (2016 - present)
- Member, Biomedical Engineering Society (2016 - present)
- Judge, Student Posters Competition, GWU Research Day (2017-2018).

### PATENTS

- I.R. Efimov, **K. K. Aras**, J. A. Rogers, E. Gremi, D. Pospisil; High resolution multi-function and conformal electronics device for diagnosis and treatment of cardiac arrhythmias. US20180235692A1. Priority Date Feb 02, 2017.

### INVITED TALKS

- "Pathophysiology of Human RVOT: Implications for Arrhythmogenesis", Leducq RHYTHM Scientific Meeting, Baltimore, Maryland, 2019
- "Critical Volume of Human Myocardium Necessary to Maintain Ventricular Fibrillation", Leducq RHYTHM Scientific Meeting, Amsterdam, Netherlands, 2018
- "Epicardial Sensitivity of Electrical Markers to Acute Myocardial Ischemia", International Society of Computerized Electrocardiology, Atlantic Beach, Florida, 2014
- "Spatio-Temporal Evolution of Acute Myocardial Ischemia", International Congress on Electrocardiology, Glasgow, Scotland, 2013
- "Heterogeneous Myocardial Electrographic Response During Ischemia", Park City, Utah, 2010
- "Electrographic Response of the Heart to Myocardial Ischemia", Park City, Utah, 2009

## EDITORIAL ACTIVITIES

### AD HOC REVIEWER

- American Journal of Physiology
- Heart Rhythm Journal
- Nature Scientific Reports
- Circulation Arrhythmia and Electrophysiology
- Journal of Electrocardiology
- International Journal of Biochemistry & Cell Biology

### HONORS & AWARDS

- NIH K99/R00 Pathway to Independence Award, 2020
- Jos Willems Young Investigator Recipient, International Society for Computerized Electrocardiology (ISCE), 2014
- Young Investigator competition finalist, International Congress on Electrocardiology (ICE), 2013
- University of Utah, Biomedical Engineering Department Scholarship, 2007-2014
- Andrews University, Computer Science Department Scholarship, 1998-2000

### GRANTS

- NIH K99/R00 Grant, “Role of epicardial adiposity as a local mediator of VT/VF dynamics in donor human hearts, Principal Investigator, 2020-2025
- George Washington University Illumina Mini Grant, “ Role of epicardial adiposity as a local mediator of VT/VF dynamics in donor human hearts”, Principal Investigator, 2018-2019

### PUBLICATIONS

#### JOURNAL ARTICLES (Citations: 244, h-index 8, i10-index 8, [PubMed Bibliography](#))

- Mengdi Han, Lin Chen, **Kedar Aras**, Cunman Liang, Xuexian Chen, Hangbo Zhao, Kan Li, Ndeye Rokhaya Faye, Bohan Sun, Jae-Hwan Kim, Wubin Bai, Quansan Yang, Yuhang Ma, Wei Lu, Enming Song, Janice Mihyun Baek, Yujin Lee, Clifford Liu, Jeffrey B. Model, Guanjun Yang, Roozbeh Ghaffari, Yonggang Huang, Igor R. Efimov, John A. Rogers. Catheter-integrated soft multilayer electronic arrays for multiplexed sensing and actuation during cardiac surgery. *Nature Biomedical Engineering*. 2020.
- Smirnov D, Pikunov A, Syunyaev R, Deviatiiarov R, Gusev O, **Aras K**, Gams A, Koppel A, Efimov IR. Genetic algorithm-based personalized models of human cardiac action potential. *PLoS One*. 2020, 15(5).
- Handa BS, Li X, **Aras KK**, Qureshi NA, Mann I, Chowdhury RA, Whinnett ZI, Linton NWF, Lim PB, Kanagaratnam P, Efimov IR, Peter NS, Ng FS. Granger Causality-Based Analysis for Classification of Fibrillation Mechanisms and Localization of Rotational Drivers. *Circ Arrhythm Electrophysiol*. 2020, 13(3).

- J.D. Tate, T.A. Pilcher, **K.K. Aras**, B.M. Burton, R.S. MacLeod. Validating Defibrillation Simulation in a Human-Shaped Phantom. *Heart Rhythm*, 2020, 17(4), 661-668.
- **KK Aras**, IR Efimov. Irreversible Electroporation: Proceed with Caution. *Heart Rhythm*, 2018, 15(12), 1880-1881.
- **KK Aras**, NR Faye, B Cathey, IR Efimov. Critical Volume of Human Myocardium Necessary to Maintain Ventricular Fibrillation. *Circulation: Arrhythmia and Electrophysiology*, 2018, 11(11).
- BM Burton, **KK Aras**, WW Good, JD Tate, B Zenger, RS MacLeod. A Framework for Image-based modeling of acute myocardial ischemia using intramurally recorded extracellular potentials. *Annals of Biomedical Engineering*, 2018, 46(9), 1325-1336.
- BM Burton, **KK Aras**, WW Good, JD Tate, B Zenger, RS MacLeod. Image-based modeling of acute myocardial ischemia using experimentally derived ischemic zone source representations. *Journal of Electrocardiology*, 2018, 51(4), 725-733
- C. Gloschat, **K. Aras**, S. Gupta, NR. Faye, H. Zhang, R.A. Syunyaev, R.A. Pryamonosov, J.Rogers, MW Kay, IR Efimov. RHYTHM: An Open Source Imaging Toolkit for Cardiac Panoramic Optical Mapping. *Nature Scientific Reports*, 2018 Feb.
- A. Rodenhauer, W.W. Good, B. Zenger, J. Tate, **K. Aras**, B. Burton, and R.S. MacLeod. PFEIFER: Preprocessing Framework for Electrograms Intermittently Fiducialized From Experimental Recordings. *Journal of Open Source Software* 2018 Jan; 3(21),472.
- **Aras KK**, Kay MW, Efimov IR. Ventricular Fibrillation: Rotors or Foci? Both! *Circulation Arrhythmia Electrophysiology* 2017 Dec; 10(12):e006011.
- C.R. Gloschat, A.C. Koppel, **K. K. Aras**, J.A. Brennan, K. M. Holzem, and I.R. Efimov. Arrhythmogenic and metabolic remodeling of failing human heart. *Journal of Physiology*. 2016 March
- **K. K. Aras**, B. M. Burton, D. J. Swenson and R.S. MacLeod. Spatial Organization of Acute Myocardial Ischemia. *Journal of Electrocardiology* 2016 Feb
- **K. K. Aras**, W. Good, J. Tate, B. M. Burton, D. Brooks, J. Coll-Font, O. Doessel, W. Schulze, D. Potyagaylo, L. Wang, P. Van Dam and R.S. MacLeod. Experimental Data and Geometric Analysis Repository - EDGAR, *Journal of Electrocardiology* 2015 Nov-Dec; 48(6):975-81
- **K. K. Aras**, B. M. Burton, D. J. Swenson and R. S. MacLeod. Epicardial Sensitivity of Electrical Markers to Acute Myocardial Ischemia, *Journal of Electrocardiology* 2014 Nov-Dec ; 47(6):836-841
- 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. *Computers in Cardiology* 2010, pages 689-692
- **K. K. Aras**, S. Shome, D.J. Swenson, J. G. Stinstra and R. S. MacLeod. Electrocardiographic Response of the Heart to Myocardial Ischemia. In A. Murray, editor, *Computers in Cardiology* 2009, pages 105-108, 2009
- D. J. Swenson, J. G. Stinstra, B. M. Burton, **K. K. Aras** and R. S. MacLeod. Wave Equation Based Interpolation on Volumetric Cardiac Electric Potentials. In A. Murray, editor, *Computers in Cardiology* 2009, pages 217-220, 2009
- D. J. Swenson, J. G. Stinstra, B. M. Burton, **K. K. Aras** and R. S. MacLeod. Evaluating the Effects of Border Zone Approximations with Subject Specific Ischemia Models. *World Congress on Medical Physiology and Biomedical Engineering*, volume 25/IV, pages 1680-1683, Heidelberg, 2009. Springer
- T. Cickovski, **K. K. Aras**, M. Swat, R. M. H. Merks, T. Glimm, M.S. Alber, J. A. Glazier, S. A. Newman, J. A. Izaguirre. From Genes To Organisms Via The Cell: A Problem Solving Environment for Multicellular Development, *Computing in Science and Engineering*, 2007;9(4):50-60

## JOURNAL ARTICLES IN REVIEW AND IN PREPARATION

- **K. K. Aras**, NR. Faye, J. Li, O. Bernus, J. A. Rogers, and I.R. Efimov. Pathophysiology of Human RVOT: Implications for Arrhythmogenesis, *Circulation*, 2020, to be submitted.
- D. Benoist, NR. Faye, **K.K. Aras**, O. Bernus, I.R. Efimov. Arrhythmogenic substrate in healthy RVOT: a common ground for RVOT arrhythmias?, *Circulation Research*, 2020, to be submitted.
- L. Zhang, **K.K. Aras**, I.R. Efimov, G. Adam. Memristors and Neuromorphic Networks for Bioelectric Diagnostics and Therapy. *IEEE Transactions on Electron Devices*, 2019, in preparation

## BOOKS

- Using Design Patterns in Scientific Applications - A Case Study in CompuCell3D. VDM Verlag Dr. Muller, 2007 (ISBN: 978-3-8364-3563-5)

## INVITED BOOK CHAPTERS

- Rose T. Yin, K. Benjamin Lee, Jeffrey S. Panting, Sheena W. Chen, **Kedar K. Aras**, Igor R. Efimov. Organ conformal electronics for cardiac therapeutics. In Udi Nussinovitch, Editor, *Emerging Technologies in Heart Diseases Volume 2: Treatments for Myocardial Ischemia and Arrhythmias*, pages 911-940. Academic Press, first edition, 2020.
- **K.K. Aras**, C.M. Ripplinger, and I.R. Efimov. The Virtual Electrode Hypothesis of Defibrillation. In Igor Efimov, Mark Kroll, and Patrick Tchou, editors, *Cardiac Bioelectric Therapy, Mechanisms and Practical Implications*, pages 331-356. Springer Nature, second edition, 2020.
- **K.K. Aras** and I.R. Efimov. Conformal Electronics Therapy for Defibrillation. In Igor Efimov, Mark Kroll, and Patrick Tchou, editors, *Cardiac Bioelectric Therapy, Mechanisms and Practical Implications*, pages 660-686. Springer Nature, second edition, 2020.
- **K.K. Aras**, B.J.D. Boukens, C.M. Ripplinger, C.R. Gloschat, and I.R. Efimov. Optical Mapping of Successful and Failed Defibrillation. In Mohammad Shenasa, editor, *Cardiac Mapping*, pages 448-463. John Wiley and Sons, fifth edition, 2019.

## ABSTRACTS

- **K. K. Aras**, NR. Faye, Z. Lin, J. Li, O. Bernus, J. A. Rogers, and I.R. Efimov. Human RVOT Transmural Arrhythmia Dynamics Under Parasympathetic and Sympathetic Stimulation, *AHA Scientific Sessions*, Philadelphia, Pennsylvania, 2019.
- **K. K. Aras**, NR. Faye, Z. Lin, J. Li, O. Bernus, J. A. Rogers, and I.R. Efimov. Quantification of Transmural Arrhythmia Dynamics in Human RVOT, *Heart Rhythm Society*, San Francisco, California, 2019.
- **K. K. Aras**, NR. Faye, A. Lee, Z. Lin, J. Li, J. A. Rogers, and I.R. Efimov. Electrophysiological Profile of the Human Right Ventricular Outflow Tract, *Gordon Research Conference*, Tuscany, Italy, 2019
- **K. K. Aras**, B. Cathey, and I. R. Efimov. Critical Cardiac Wavelength Volume Predicts Arrhythmia Vulnerability in the Human Left Ventricle, *AHA Scientific Sessions*, Anaheim, 2017.
- **K. K. Aras**, B. Cathey, and I.R. Efimov. Minimum Reentrant Path Volume Predicts Arrhythmia Vulnerability in the Human Left Ventricle, *Biomedical Engineering Society Conference*, Phoenix, Arizona, 2017
- **K. K. Aras** and I.R. Efimov. Minimum Reentrant Path Volume Predicts Arrhythmia Vulnerability in the Human Left Ventricle, *Gordon Research Conference*, Ventura, California, 2017

- **K. K. Aras**, B. M. Burton, D. J. Swenson and R. S. MacLeod. Spatio-Temporal Evolution of Acute Myocardial Ischemia, Utah Biomedical Engineering Conference, Salt Lake City, 2012
- **K. K. Aras**, D. J. Swenson and R. S. MacLeod. Origin of Electrical Myocardial Response to Acute Ischemia is not limited to Sub-endocardium. International Society of Computerized Electrocardiology, San Jose, 2011

## **REFERENCES**

Available upon request