

# Kedar Kirtikumar Aras, Ph.D.

Department of Biomedical Engineering  
George Washington University  
800 22<sup>nd</sup> Street, Northwest  
Washington, D.C. 20052  
Phone: 269-519-3818  
Email: [kedar\\_aras@gwu.edu](mailto:kedar_aras@gwu.edu)  
Website: <http://www.kedararas.com>  
Twitter: <https://twitter.com/kedararas>

## CURRICULUM VITAE

Last updated: 06/10/2021

### **RESEARCH INTERESTS**

I am fascinated by how external factors such as obesity can modulate cardiac arrhythmias at molecular, cellular, tissue and whole organ level. My work focuses on characterizing the role of cardiac obesity in promoting arrhythmias using a combination of Multiomics (transcriptomics, metabolomics, lipidomics, proteomics), Electrophysiology (optical and electrical mapping), and Adipose Biology.

### **EDUCATION**

University of Utah, Salt Lake City, UT Ph.D. in Biomedical Engineering, August 2015	2007-2015
University of Notre Dame, South Bend, IN M.S. in Computer Science and Engineering, January 2006	2002-2006
Andrews University, Berrien Springs, MI B.S. in Computer Science, December 2000	1998-2000

### **RESEARCH EXPERIENCE**

Postdoctoral Research Fellow, George Washington University, Washington, DC Dr. Igor R. Efimov Project title: Arrhythmia mechanism in donor human hearts	2015-present
Predocctoral Research Fellow, University of Utah, Salt Lake City, UT Dr. Rob S. MacLeod Thesis title: Bioelectric source characterization of acute myocardial ischemia	2007-2015
Graduate Student, University of Notre Dame, South Bend, IN Dr. Jesus A. Izaguirre Thesis title: Using design patterns in scientific applications	2002-2006

## **INDUSTRY EXPERIENCE**

Intellectual Property Manager, Whirlpool Corporation, Benton Harbor, MI	2004-2007
Business Analyst, Whirlpool Corporation, Benton Harbor, MI	2002-2004
Project Engineer, Whirlpool Corporation, Benton Harbor, MI	2000-2002

## **HONORS & AWARDS**

NIH K99/R00 Pathway to Independence Award (NHLBI)	2020-present
Jos Willems Young Investigator Recipient (ISCE)	2014
Young Investigator Finalist (ICE)	2013
Graduate student scholarship (University of Utah)	2007-2015
Undergraduate student scholarship (Andrews University)	1998-2000

## **PUBLICATIONS**

### ***In preparation***

1. **Aras KK**, Gams A, Faye NR, Brennan JB, Goldrick K, Li J, Zhong Y, Chiang C, Smith EH, Poston MD, Potter J, Hanna P, Mori S, Ajijola O, Shivkumar K, Hoover DB, Viventi J, Rogers JA, Bernus O, Efimov IR. Electrophysiology of the human right ventricle outflow tract: Implications for arrhythmogenesis.

### ***Published***

1. Yang Q, Wei T, Yin RT, Wu M, Xu Y, Koo J, Choi YS, Xie Z, Chen SW, Kandela I, Yao S, Deng Y, Avila R, Liu T, Bai W, Yang Y, Han M, Zhang Q, Haney CR, Lee KB, **Aras K**, Wang T, Seo M, Luan H, Lee SM, Brikha A, Ghoreishi-Haack N, Tran L, Stepian I, Aird F, Waters EA, Yu X, Banks T, Trachiotis G, Torkelson JM, Huang Y, Kozorovitskiy Y, Efimov IR, Rogers JA. Photocurable bioresorbable adhesives as functional interfaces between flexible bioelectronic devices and soft biological tissues. *Nat Materials*, in press.
2. Kyrlyachenko S, Georges A, Yu M, Berrandou T, Guo L, Bruneval P, Rubio T, Gronwald J, Baraki H, Kutschka I, **Aras K**, Efimov IR, Norris RA, Voigt N, Bouatia-Naji N. Chromatin Accessibility of Human Mitral Valves and Functional Assessment of MVP Risk Loci. *Circ Res*. 2021
3. Han M\*, Chen L\*, **Aras K\***, Liang C, Chen X, Zhao H, Li K, Faye NR, Sun B, Kim JH, Bai W, Yang Q, Ma Y, Lu W, Song E, Baek JM, Lee Y, Liu C, Model JB, Yang G, Ghaffari R, Huang Y, Efimov IR, Rogers JA. Catheter-integrated soft multilayer electronic arrays for multiplexed sensing and actuation during cardiac surgery. *Nat Biomed Eng*. 2020. \*These authors contributed equally to the work.
4. 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
5. Tate JD, Pilcher TA, **Aras KK**, Burton BM, MacLeod RS. Validating defibrillation simulation in a human-shaped phantom. *Heart Rhythm*. 2020
6. Handa BS, Li X, **Aras KK**, Qureshi NA, Mann I, Chowdhury RA, Whinnett ZI, Linton NWF, Lim PB, Kanagaratnam P, Efimov IR, Peters NS, Ng FS. Granger Causality-Based Analysis for

Classification of Fibrillation Mechanisms and Localization of Rotational Drivers. *Circ Arrhythm Electrophysiol.* 2020

7. **Aras KK**, Efimov IR. Irreversible electroporation: Proceed with caution. *Heart Rhythm.* 2018
8. **Aras KK**, Faye NR, Cathey B, Efimov IR. Critical Volume of Human Myocardium Necessary to Maintain Ventricular Fibrillation. *Circ Arrhythm Electrophysiol.* 2018
9. Burton BM, **Aras KK**, Good WW, Tate JD, Zenger B, MacLeod RS. A Framework for Image-Based Modeling of Acute Myocardial Ischemia Using Intramurally Recorded Extracellular Potentials. *Ann Biomed Eng.* 2018
10. Burton BM, **Aras KK**, Good WW, Tate JD, Zenger B, MacLeod RS. Image-based modeling of acute myocardial ischemia using experimentally derived ischemic zone source representations. *J Electrocardiol.* 2018
11. Gloschat C, **Aras K**, Gupta S, Faye NR, Zhang H, Syunyaev RA, Pryamonosov RA, Rogers J, Kay MW, Efimov IR. RHYTHM: An Open Source Imaging Toolkit for Cardiac Panoramic Optical Mapping. *Sci Rep.* 2018
12. Rodenhauer A, Good WW, Zenger B, Tate J, **Aras K**, Burton B, MacLeod RS. PFEIFER: Preprocessing Framework for Electrograms Intermittently Fiducialized from Experimental Recordings. *J Open Source Softw.* 2018
13. **Aras KK**, Kay MW, Efimov IR. Ventricular Fibrillation: Rotors or Foci? Both!. *Circ Arrhythm Electrophysiol.* 2017 Dec
14. Gloschat CR, Koppel AC, **Aras KK**, Brennan JA, Holzem KM, Efimov IR. Arrhythmogenic and metabolic remodeling of failing human heart. *J Physiol.* 2016
15. **Aras K**, Burton B, Swenson D, MacLeod R. Spatial organization of acute myocardial ischemia. *J Electrocardiol.* 2016
16. **Aras K**, Good W, Tate J, Burton B, Brooks D, Coll-Font J, Doessel O, Schulze W, Potyagaylo D, Wang L, van Dam P, MacLeod R. Experimental Data and Geometric Analysis Repository-EDGAR. *J Electrocardiol.* 2015
17. **Aras K**, Burton B, Swenson D, MacLeod R. Sensitivity of epicardial electrical markers to acute ischemia detection. *J Electrocardiol.* 2014
18. Tate J, Pilcher T, **Aras K**, Burton B, MacLeod R. Verification of a Defibrillation Simulation Using Internal Electric Fields in a Human Shaped Phantom. *Computing in Cardiology (2010).* 2010
19. **Aras KK**, Shome S, Swenson DJ, Stinstra J, MacLeod RS. Electrographic Response of the Heart to Myocardial Ischemia. *Comput Cardiol.* 2009
20. Cickovski T, **Aras K**, Alber MS, Izaguirre JA, Swat M, Glazier JA, Merks RM, Glimm T, Hentschel HG, Newman SA. From Genes to Organisms Via the Cell A Problem-Solving Environment for Multicellular Development. *Comput Sci Eng.* 2007

## **PATENTS**

Efimov IR, **Aras KK**, Rogers JA, Gremi E, Pospisil D. High resolution multi-function and conformal electronics device for diagnosis and treatment of cardiac arrhythmias. US Patent App. 15/886,673, filed Aug. 8, 2018.

## **INVITED BOOK CHAPTERS**

1. Yin RT, Lee B, Panting JS, Chen SW, **Aras KK**, Efimov IR. 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.
2. **Aras KK**, Ripplinger CM, Efimov IR. 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.
3. **Aras KK**, Efimov IR. 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.
4. **Aras KK**, Boukens BJ, Ripplinger CM, Gloschat CR, Efimov IR. Optical mapping of successful and failed defibrillation. In Mohammad Shenasa, editor, *Cardiac Mapping*, pages 448-463. John Wiley and sons, fifth edition, 2019.

## **TEACHING EXPERIENCE**

Guest Lecturer Fall 2020  
BME6045: Cardiovascular Engineering & Technology  
Biomedical Engineering Department, George Washington University  
Course master: Dr. Igor Efimov

Guest Lecturer Fall 2015-2018  
BME3820: Principles and Practice of Biomedical Engineering  
Biomedical Engineering Department, George Washington University  
Course master: Dr. Matthew Kay

Co-Instructor Summer 2014-2015  
Image-based Biomedical Modeling  
University of Utah  
Course curriculum included 10 days of a combination of lectures, demos, and structure laboratory exercises on topics including: Image processing and segmentation, Scientific visualization, Geometry processing, and Bioelectric activity and fields.

Teaching Assistant Spring 2009  
BE6000: Systems Physiology I  
Bioengineering Department, University of Utah  
Advisor: Dr. Rob MacLeod

## **STUDENTS MENTORED IN RESEARCH**

Undergraduate, Brianna Cathey, George Washington University 2015-2019  
Undergraduate, Shubham Gupta, George Washington University 2015-2019  
Graduate Student, Maria Ines Gândara, George Washington University 2021-present

## **RESEARCH SUPPORT**

### **Active**

K99 HL148523 Aras (PI) 05/07/2020-04/30/2025

NIH (NHLBI)

Project title: Role of epicardial adiposity as a local mediator of VT/VF dynamics in donor hearts.

Project goal: This project will determine whether epicardial adipose tissue paracrine signaling promotes VT/VF in obese human hearts via local inflammation mediated CaMKII hyperactivity.

Role: PI

R01 HL141470 Efimov (PI) 01/10/2019-12/31/2022

NIH (NHLBI)

Project title: High-Definition conformal electronics for VT/VF

Project goal: This project will develop next generation of bioelectronics platform for high-definition diagnostics and electrotherapy of sudden cardiac death.

Role: Postdoctoral Fellow.

## **OUTREACH**

Volunteer Judge 2017-2018

GWU Research Showcase, George Washington University, Washington D.C.

## **PROFESSIONAL DEVELOPMENT**

GWU Genomics Data Carpentry Workshop Spring 2021

GWU Responsible Conduct of Research Spring 2020

## **PROFESSIONAL ORGANIZATION MEMBERSHIPS**

American Heart Association 2017-present

Heart Rhythm Society 2019-present

George Washington Postdoc Association 2019-present

## **INVITED ORAL PRESENTATIONS**

Heart Rhythm Society (HRS); Boston MA 2021

Leducq RHYTHM Scientific Meeting; Baltimore MD 2019

Leducq RHYTHM Scientific Meeting; Amsterdam, Netherlands 2018

International Society of Computerized Electrocardiology; Atlantic Beach FL 2014

International Congress on Electrocardiology; Glasgow, Scotland 2013

Computing in Cardiology; Park City UT 2009-2010

## **CONFERENCES**

Gordon Research Conference; Ventura CA (poster) 2021

Heart Rhythm Society; Boston MA (second poster) 2021

American Heart Association Scientific Sessions; Philadelphia PA (poster) 2019

Heart Rhythm Society; San Francisco CA (poster) 2019

Gordon Research Conference; Tuscany, Italy (poster) 2019

American Heart Association Scientific Sessions; Anaheim CA (poster)	2017
Biomedical Engineering Society; Phoenix AZ (poster)	2017
Gordon Research Conference; Ventura CA (poster)	2017
Utah Biomedical Engineering Conference; Salt Lake City UT (poster)	2012-2014
International Society of Computerized Electrocardiology, San Jose CA (poster)	2011

## **SERVICE**

<b>Thesis Committee Member</b>	2020-present
Maria Ines Gândara, M.S student of Dr. Carla Quintão (NOVA University of Lisbon)	

## **Reviewer**

*American Journal of Physiology*

*Heart Rhythm Journal*

*Nature Scientific Reports*

*Circulation Arrhythmia and Electrophysiology*

*International Journal of Biochemistry and Cell Biology*

*Frontiers in Cardiovascular Medicine*

*Cardiovascular Engineering and Technology*

*Journal of Electrocardiology*