MIKAYLE HOLM

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EDUCATION

PHD CANDIDIATE IN BIOMEDICAL ENGINEERING Aug. 2016-Present

Visible Heart Labs, University of Minnesota, Minneapolis, MN

- PhD Thesis: Using Imaging to Describe the Cardiac Pacing System Device-Tissue Interactions
- Advisor: Paul A. Iaizzo

BACHELOR OF SCIENCE IN ENGINEERING Aug. 2012-May 2016

Fulton Schools of Engineering and Barrett Honors College, Arizona State University, Tempe, AZ

- Biomedical Engineering, Mathematics minor

EXPERIENCE

MEDTRONIC PROCEDURE INNOVATION TEAM INTERN Oct. 2018-Present

CRHF, Mounds View, MN

- Analysis of clinical radiographs and CTs for next generation pacing and defibrillation devices
- Investigating the effect of posture on different cardiac leads in fresh cadavers
- Digitally tracking device motion over time with CT imaging in pre-clinical animal models

RESEARCH ASSISTANT IN THE VISIBLE HEART LABS Nov. 2016-Present

University of Minnesota, Minneapolis, MN

- Expert in human and swine cardiac anatomy and physiology
- Relevant experience includes clinical static and dynamic imaging, cardiac electrophysiology, echocardiography, device design, anatomical modeling, 3D printing and laser cutting, virtual reality, technical writing, and presenting research

PRESENTATIONS

Visible Heart Mobile – A Portable Ex Vivo Heart Perfusion Apparatus

- **Mikayle A. Holm**, Alex Mattson, Lars Mattison, Erik Gaasedelen, Jorge Zhingre Sanchez, Paul A. Iaizzo
- Design of Medical Devices, Minneapolis, MN, April 2018

Concept Mapping in a Student-Centered, Biomaterials Classroom

- Rachel Ponstein, **Mikayle A. Holm**, Sarah Stabenfeldt, Casey Ankeny
- Biomedical Engineering Society, Tempe, AZ, October 2017

POSTERS

Visualization of Vessel Manipulation During Large Bore Transcatheter Insertion in Virtual Reality

- **Mikayle A. Holm**, Rohan Thakur, Tinen Iles, Paul Iaizzo
- Transcatheter Therapies, San Francisco, CA
- September 2019

Computationally Determining Ideal Insertion Site for Transapical Procedures

- **Mikayle A. Holm**, David Ramirez, Paul Iaizzo
- Department of Surgery Day, Minneapolis, MN
- May 2019

Distributions of Arterial Calcification Along Transcatheter Delivery System Pathway

- **Mikayle A. Holm**, Paul A. Iaizzo
- Design of Medical Devices, Minneapolis, MN
- April 2019

Detecting Lead Adhesions to the SVC for Lead Extraction Procedures

- **Mikayle A. Holm**, Pierce Vatterott, Paul A. Iaizzo
- Institute for Engineering in Medicine Conference, Minneapolis, MN
- September 2018

Virtual Reality to Bone Anatomy Education
- **Mikayle A. Holm**, Erik Gaasedelen, Paul A. Iaizzo
- Department of Surgery Day, Minneapolis, MN
- May 2018

Using WebGL to Teach Bone Identification
- **Mikayle A. Holm**, Erik Gaasedelen, Paul A. Iaizzo
- Design of Medical Devices, Minneapolis, MN
- April 2018

Utilization of 3D Printing and Virtual Reality to Train Physicians on Lead Extraction Procedures
- **Mikayle A. Holm**, Paul Iaizzo
- Institute of Engineering in Medicine Conference, Minneapolis, MN
- November 2017

Reconstruction of a Full Body Skeleton from Computed Tomography Images of a Fresh Human Cadaver
- **Mikayle A. Holm**, Jorge Zhingre Sanchez, Paul Iaizzo
- Department of Surgery Day, Minneapolis, MN
- May 2017

3D Modeling and Visualization of a Human Cadaver Organs for Clinical and Educational Applications
- Jorge Zhingre Sanchez, **Mikayle A. Holm**, Paul Iaizzo
- Department of Surgery Day, Minneapolis, MN
- May 2017

Effect of Thermoneutral Temperature on Adaptive Thermogenesis
- **Mikayle A. Holm**, Richard Herman, Michael Caplan
- Fulton Undergraduate Research Initiative Symposium, Arizona State University
- May 2016

Using Compact Quantum Dots and Single Molecule RNA FISH to Study Gene Expression
- **Mikayle A. Holm**, Shweta Chittoor, Andrew Smith
- Biomedical Engineering Society Conference, Tampa, FL
- October 2015

Comparison of Quantum Dots and Standard Dyes in Identifying Overexpression of GAPDH
- **Mikayle A. Holm**, Shweta Chittoor, Andrew Smith
- Summer Research Opportunities Program, University of Illinois Urbana-Champaign
- July 2015

PUBLICATIONS

Study of Arterial Calcification Along Transcatheter Delivery System Pathway
- **Mikayle A. Holm**, Paul Iaizzo
- ASME Proceedings
- April 2019

Virtual Reality and Visualization of 3D Reconstructed Medical Imaging: Learning Variations within Detailed Human Anatomies
- Erik Gaasedelen, Alex Deakyne, Alex Mattson, Lars Mattison, **Mikayle A. Holm**, Jorge Zhingre Sanchez, Megan Schmidt, Michael Batemen, Tinen Iles, Paul Iaizzo
- Anatomical Sciences Education
- January 2019

Importance of Human Cadaver Studies in Education and Medical Device Research: Insights Derive from Various Imaging Studies and Modalities
- **Mikayle A. Holm**, Paul Iaizzo

- Engineering in Medicine
- January 2019

Using WebGL for Teaching Bone Identification
- **Mikayle A. Holm**, Erik Gaasedelen, Paul Iaizzo
- ASME Proceedings
- April 2018

A Portable Ex Vivo Heart Perfusion Apparatus for Cardiac CT Imaging: Visible Heart® Mobile
- **Mikayle A. Holm**, Alex Mattson, Lars Mattison, Erik Gaasedelen, Jorge Zhingre Sanchez, Paul Iaizzo
- ASME Proceedings
- April 2018

Direct Visualization of the Removal of Chronically Implanted Pacing Leads from an Unfixed Human Cadaver
- **Mikayle A. Holm**, BSE, Lars Mattison, BS, Pierce Vatterott, MD, Paul Iaizzo, PhD
- Heart Rhythm Case Reports
- October 2017

Historical Perspective and Anatomic Study of the First Successful Ventricular Septal Defect Closure using Cross-circulation
- Tinen Iles, **Mikayle A. Holm**, Andrew Calvin, James Moller, Paul Iaizzo
- Circulation
- In Review

Multimodal Imaging of the Extraction of Pacing or Defibrillator Leads from Perfusion-fixed Human Hearts
- **Mikayle A. Holm**, Lars Mattison, Pierce Vatterott, Michael Eggen, Paul Iaizzo
- Journal of the American College of Cardiology Imaging
- In Preparation

Analyzing Pre-procedural CT Images to Estimate Lead-Vascular Attachments
- **Mikayle A. Holm**, Pierce Vatterott, Imran Syed, Akbar Khan, Tinen Iles, Paul Iaizzo
- Heart Rhythm
- In Preparation

CONFERENCES

Transcatheter Therapies, San Francisco, CA, September 2019
Design of Medical Devices, Minneapolis, MN, April 2019
Lead Extraction Symposium, St. Paul, MN, September 2018
Design of Medical Devices, Minneapolis, MN, April 2018
Lead Extraction Symposium, St. Paul, MN, October 2017
Heart Rhythm Society, Chicago, IL, May 2017
Design of Medical Devices, Minneapolis, MN, April 2017
Biomedical Engineering Society, Minneapolis, MN, October 2016
American Society of Engineering Education, New Orleans, LA, June 2016
Society of Hospital Medicine, San Diego, CA, March 2016
Biomedical Engineering Society, Tampa, FL, October 2015

TCT (2019), HRS (2017), Lead Extraction Symposium (2017-2019), DMD (2017-2020), BMES (2015, 2016)

TEACHING APPOINTMENTS

Principles of Physiology Lab, University of Minnesota, Fall 2019
Neuromuscular Junction, University of Minnesota, Summer 2019
Medical Device Prototyping, University of Minnesota, Spring 2019
Human Cardiac Anatomy and Physiology, University of Minnesota, Winter 2019
Principles of Physiology Lab, University of Minnesota, Fall 2018
Neuromuscular Junction, University of Minnesota, Summer 2018
Medical Device Prototyping, University of Minnesota, Spring 2018

Human Cardiac Anatomy and Physiology, University of Minnesota, Winter 2018
Neuromuscular Junction, University of Minnesota, Summer 2017

Medical Device Prototyping (2018, 2019), Human Cardiac Anatomy and Physiology (2018, 2019), Principles of Physiology (2018, 2019), Neuromuscular Junction (2017-2020)

AWARDS AND ACTIVITIES

- Present Anatomical Heart Specimens and Devices: HRS (2017), AHA Heart Walk (2017 - 2020), Minnesota State Fair (2017)
- NSF GRFP Honorable Mention (2016)
- Regent's High Honors Scholar (2012-2016)
- Distinguished Service Award (April 2016)
- Summa Cum Laude (May 2016)
- Moeur Award (April 2016)
- Deans' List (2012-2016)
- Conference Poster Presentations
- "A Heart to Learn" Outreach Events - Local high school and middle school presentations about the heart

SKILLS

Benchtop anatomical model development
Cardiothoracic anatomy and physiology
Preclinical device testing
Materialise Mimics and 3-Matic
Research protocol development
Large animal experiments
MRI, CT, and Ultrasound Imaging and Analysis
SolidWorks
Matlab
Arduino
Public speaking/presenting research
Expertise in:

- Lead extraction
- Image analysis
- Cadaveric dissection
- Vascular pathways
- Ventricular assist devices