Design of Medical Devices
Conference 2016

April 11th, 12th-14th
The Commons Hotel & McNamara Alumni Center
Minneapolis, MN
Welcome to the 15th Annual University of Minnesota Design of Medical Devices Conference

The Design of Medical Devices Conference was created in 2001 to enhance collaboration between academia and industry, promote policy, research and educational initiatives as they relate to medical device design and to support medical devices education at the University of Minnesota.

This forum, uniquely positioned in the middle of one of the most significant medical device communities in the world, has provided invaluable insight and leadership to promote the future of this evolving industry. Conference attendance has more than tripled since its inception and we look forward to continued growth.

The success of this conference is due in large part to the continued support from our industry sponsors and University of Minnesota partners. On behalf of the DMD Planning Committee, we thank you. We hope you enjoy this year’s conference!

Sincerely,
2016 Design of Medical Devices Conference Planning Committee

The Design of Medical Devices Conference is presented by the University of Minnesota Medical Devices Center (part of the Institute for Engineering in Medicine), the College of Science and Engineering and the Department of Mechanical Engineering. In Cooperation with the Office of University Economic Development, University of Minnesota.

Connecting to the Wireless Network

<table>
<thead>
<tr>
<th>The Commons Hotel</th>
<th>McNamara Alumni Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network: Commons Convention</td>
<td>Network: UofM Guest</td>
</tr>
<tr>
<td>Password: DMD2016 (case-sensitive)</td>
<td>Follow the prompts to gain access</td>
</tr>
<tr>
<td>For technical assistance call 612-362-6662</td>
<td></td>
</tr>
</tbody>
</table>

tag #dmdconf in your social media postings
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 am</td>
<td>Check-in and Continental Breakfast</td>
<td></td>
</tr>
<tr>
<td>8:00 am</td>
<td>Welcome and Introduction</td>
<td>Paul Iaizzo and William Durfee, University of Minnesota</td>
</tr>
<tr>
<td>8:25 am</td>
<td>How New Medical Products are Developed</td>
<td>William Durfee, Mechanical Engineering, University of Minnesota</td>
</tr>
<tr>
<td>9:10 am</td>
<td>Global Markets for Medical Devices</td>
<td>Tim Laske, Vice President, Research and Business Development, Medtronic AF Solutions</td>
</tr>
<tr>
<td>9:40 am</td>
<td>Creativity Basics: Warming the brain.</td>
<td>Barry Kudrowitz, College of Design, University of Minnesota</td>
</tr>
<tr>
<td>10:15 am</td>
<td>Networking Break</td>
<td></td>
</tr>
<tr>
<td>10:40 am</td>
<td>Market Assessments</td>
<td>Mike Finch, Acting Director, MILI Carlson School of Management, University of Minnesota</td>
</tr>
<tr>
<td>11:10 am</td>
<td>Innovation Exercise 1: Generate an Idea that Solves a Need</td>
<td></td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Networking Lunch</td>
<td></td>
</tr>
<tr>
<td>12:45 pm</td>
<td>Evaluating Your Medical Device Idea Using Bench Tests, Animal Tests and Clinical Trials</td>
<td>Paul Iaizzo, Surgery, Institute for Engineering in Medicine, University of Minnesota</td>
</tr>
<tr>
<td>1:30 pm</td>
<td>Medical Device Regulations</td>
<td>Susan Alpert, Executive in Residence, MILI, University of Minnesota</td>
</tr>
<tr>
<td>2:05 pm</td>
<td>Reimbursement for Medical Devices</td>
<td>Mike Finch, Acting Director, MILI, Carlson School of Management, University of Minnesota</td>
</tr>
<tr>
<td>2:40 pm</td>
<td>Protecting Your Intellectual Property Through Patents</td>
<td>William Durfee, Mechanical Engineering, University of Minnesota</td>
</tr>
<tr>
<td>3:20 pm</td>
<td>Networking Break</td>
<td></td>
</tr>
<tr>
<td>3:35 pm</td>
<td>Innovation Exercise 2: Develop a New Medical Technology Product</td>
<td></td>
</tr>
<tr>
<td>4:20 pm</td>
<td>Team Presentations</td>
<td></td>
</tr>
<tr>
<td>4:40 pm</td>
<td>The Corporate View of Technology Assessments and Acquisitions</td>
<td>Tim Laske, Vice President, Research and Business Development, Medtronic AF Solutions</td>
</tr>
<tr>
<td>5:10 pm</td>
<td>How to Build a Medical Device Company</td>
<td>Michael Hoey, Co-Founder &amp; Chief Technology Officer, NxThera Inc.</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>Adjourn</td>
<td></td>
</tr>
</tbody>
</table>

2016 Design of Medical Devices Conference
www.dmd.umn.edu
Additions to the 2016 Program

International Student Design Showcase Judges
Tuesday, April 12, 5:30-7:30, University Hall, McNamara Alumni Center

- Shai Ashkenazi, University of Minnesota
- Dawn Bardot, Medical Device Innovation Consortium
- Jim Fairman, QFO Labs
- Danny Gelfman, Medtronic, Inc.
- Joe Hale, University of Minnesota
- Elizabeth Hsiao-Wecksler, University of Illinois at Urbana–Champaign

- Alec Johnson, St. Thomas University
- Steve Saliterman, University of Minnesota
- Chris Scorzelli, Medical Devices Consultant
- Alena Talkachova, University of Minnesota
- Greg Voss, University of Minnesota

Government Funding of Start-ups
Wednesday, April 13, 10:30-12:00, Thomas H. Swain Room, McNamara Alumni Center

Speaker Addition:
“SBIR Research Funding for Start-ups”
Ruth Shuman, Program Director, National Science Foundation

Three-in-Five Competition
Wednesday, April 13, 8:00-10:00, Meridian Ballrooms 2/3, The Commons Hotel

Speaker Change:
Sadra Hemmati, Department of Mechanical, Aerospace, and Biomedical Engineering, University of Tennessee

Associate Level Sponsor
Supporting Level Sponsor

Engineering World Health
University of Minnesota
A Heart to Learn

Tuesday & Wednesday from 8:00am-4:00pm (*closed during lunches*)
Thursday from 8:00am-12:00pm
Think 4, The Commons Hotel

This is an interactive display of perfusion fixed human hearts courtesy of the Visible Heart® Laboratory and the Department of Surgery. This is a unique library of human hearts received from organ donors and their families via LifeSource and the University of Minnesota’s Anatomy Bequest Program.

Perfusion fixation dilates these hearts as if they were filled with blood (diastole). Additionally, computer stations will be available to introduce The Atlas of Human Cardiac Anatomy and utilize during the display.

The Atlas of Human Cardiac Anatomy is an interactive educational site created and maintained by the Visible Heart® Laboratory at the University of Minnesota in collaboration with Medtronic, Inc. This site features images created from the Visible Heart® project, a novel educational tool which allows for viewing functional human cardiac anatomy from within.

www.vhlab.umn.edu
Tuesday, April 12, 2016

7:00 a.m.  Registration and Continental Breakfast  

The Commons Hotel

8:00 a.m.  Meridian Ballrooms 1/4  The Commons Hotel

Conference Welcome and Plenary Session

Moderators:  
Arthur Erdman, University of Minnesota  
William Durfee, University of Minnesota  
On the Design of Bionic Leg Devices: The Science of Extreme Interface  
Hugh Herr  
Massachusetts Institute of Technology

LIVE CLINICAL CASE: ABDOMINAL AORTIC ANEURYSM  
A.J. Johnson Great Room  
McNamara Alumni Center

Moderator:  
Dan Kussman, Boston Scientific Corporation  
St. Mary Medical Center Surgeons:  
David Drucker, MD, FACC, FSCAI  
George Heyrich, MD, FACC, FSCAI, FSCCT

FUNCTIONAL & QUANTITATIVE IMAGING  
Ski-U-Mah

Emad Ebbini, University of Minnesota  
Diffusion MRI for Imaging the Brain and Spine  
Christophe Lenglet  
University of Minnesota  
Functional MR Parameter Mapping in the Myocardium  
Mehmet Akçağaya  
University of Minnesota  
Perfusion Imaging Using Contrast Enhanced Ultrasound  
Emad Ebbini  
University of Minnesota

MEDICAL DEVICE INNOVATION  
The A.S. Swain Room

Joe Hale, University of Minnesota  
Presernters/Participants:  
Tom KraMer  
Kablooie Design  
Brian Mullins  
Kablooie Design  
Brian Krohn  
University of Minnesota  
Brad Slaker  
University of Minnesota

CM&S 1: AN INTRO TO FDA MEDICAL DEVICE DEVELOPMENT TOOLS (MDDT) AND UPDATES FROM SUBMITTERS  
A.I. Johnson Great Room  The Commons Hotel

What is an MDDT and How Does Qualification Work?  
Donna Lochner  
U.S. Food and Drug Administration

Computational Durability Software as a Medical Device Development Tool (MDDT)  
Sanjeev Kulkarni  
VEXTEC Corporation  
Abaqus Knee Simulator - An Example of Computational Modeling as a Medical Device Development Tool  
Xiayi (Cheryl) Liu  
Stryker Orthopaedics

Human Phantoms as Medical Device Development Tools for RF Heating  
Greg Noetscher  
U.S. Army Natick Soldier Research Development and Engineering Center

DATA, MEDICAL DEVICES, AND HUMAN BEHAVIOR: THE MONITORED SELF  
Meridian Ballroom 2/3  The Commons Hotel

Claudia Neuhauser, University of Minnesota  
Constantin Alderis, University of Minnesota  
Kathleen Harder, University of Minnesota

Daynamica: A Smartphone Solution for Understanding Human Activity Patterns and Emotional Well-Being  
Yingling Fan  
University of Minnesota

Biomechanics for Medical Diagnostics and Continuous Monitoring  
Rajesh Rajamani  
University of Minnesota  
Diabetes Mobile Health: Creating Patient Opportunity and Payor Savings  
Lonnay Storno  
POPS! Diabetes Care

HUMAN FACTORS: FOCUS ON ROBOTS IN HEALTH CARE  
Ski-U-Mah  The Commons Hotel

Kathleen Harder, University of Minnesota  
What’s the Robot Saying? Designing Healthcare Robots to Interface with Patients  
Zane Thimmesch-Gill  
University of Minnesota  
Regulatory Aspects of Robots in Health Care  
Drew Simshaw  
Georgetown Law’s Institute for Public Representation

NEUROENGINEERING 2: NEW TECHNOLOGIES & APPLICATIONS  
Meridian Ballroom 1  The Commons Hotel

Session Organizers:  
Tamer Akkin, University of Minnesota  
Tay Netoff, University of Minnesota

DEFT: Dexterous Hand Control through Fascicular Targeting  
Edward Keffer  
Nerves Incorporated  
Molecular Neurotechnologies  
Daniel Schmidt  
University of Minnesota  
The Argus II Retinal Prosthesis Results at the University of Minnesota  
Sandra Rocio Montezuma  
University of Minnesota

ADVANCES IN MEDICAL DEVICES 1  
Meridian Ballroom 4  The Commons Hotel

Session Organizers:  
Matthew Johnson, University of Minnesota  
Vincenzo Parenti-Castelli, University of Bologna

Tracheal Cartilage Ring Biomechanical Properties for Pediatric Exovent Design (DMD2016-8474)  
Teja Karkhanis  
Texas A&M University  
A New Test Rig for Human Joint and Prosthesis Characterization (DMD2016-8436)  
Vincenzo Parenti-Castelli  
University of Bologna  
A Rigid Mechanism with Uniform, Variable Curvature (DMD2016-8483)  
Kaitlin Oliver Butler  
University of Tennessee

Thematic Framing: Creating Healthcare Innovations (DMD2016-8490)  
Wileen Mees van der Bijdide Group

Conference Welcome and Plenary Session

Moderators:  
Arthur Erdman, University of Minnesota  
William Durfee, University of Minnesota  
On the Design of Bionic Leg Devices: The Science of Extreme Interface  
Hugh Herr  
Massachusetts Institute of Technology

LIVE CLINICAL CASE: ABDOMINAL AORTIC ANEURYSM  
A.J. Johnson Great Room  
McNamara Alumni Center

Moderator:  
Dan Kussman, Boston Scientific Corporation  
St. Mary Medical Center Surgeons:  
David Drucker, MD, FACC, FSCAI  
George Heyrich, MD, FACC, FSCAI, FSCCT

FUNCTIONAL & QUANTITATIVE IMAGING  
Ski-U-Mah

Emad Ebbini, University of Minnesota  
Diffusion MRI for Imaging the Brain and Spine  
Christophe Lenglet  
University of Minnesota  
Functional MR Parameter Mapping in the Myocardium  
Mehmet Akçağaya  
University of Minnesota  
Perfusion Imaging Using Contrast Enhanced Ultrasound  
Emad Ebbini  
University of Minnesota

MEDICAL DEVICE INNOVATION  
The A.S. Swain Room

Joe Hale, University of Minnesota  
Presernters/Participants:  
Tom KraMer  
Kablooie Design  
Brian Mullins  
Kablooie Design  
Brian Krohn  
University of Minnesota  
Brad Slaker  
University of Minnesota

CM&S 1: AN INTRO TO FDA MEDICAL DEVICE DEVELOPMENT TOOLS (MDDT) AND UPDATES FROM SUBMITTERS  
A.I. Johnson Great Room  The Commons Hotel

What is an MDDT and How Does Qualification Work?  
Donna Lochner  
U.S. Food and Drug Administration

Computational Durability Software as a Medical Device Development Tool (MDDT)  
Sanjeev Kulkarni  
VEXTEC Corporation  
Abaqus Knee Simulator - An Example of Computational Modeling as a Medical Device Development Tool  
Xiayi (Cheryl) Liu  
Stryker Orthopaedics

Human Phantoms as Medical Device Development Tools for RF Heating  
Greg Noetscher  
U.S. Army Natick Soldier Research Development and Engineering Center

DATA, MEDICAL DEVICES, AND HUMAN BEHAVIOR: THE MONITORED SELF  
Meridian Ballroom 2/3  The Commons Hotel

Claudia Neuhauser, University of Minnesota  
Constantin Alderis, University of Minnesota  
Kathleen Harder, University of Minnesota

Daynamica: A Smartphone Solution for Understanding Human Activity Patterns and Emotional Well-Being  
Yingling Fan  
University of Minnesota

Biomechanics for Medical Diagnostics and Continuous Monitoring  
Rajesh Rajamani  
University of Minnesota  
Diabetes Mobile Health: Creating Patient Opportunity and Payor Savings  
Lonnay Storno  
POPS! Diabetes Care

HUMAN FACTORS: FOCUS ON ROBOTS IN HEALTH CARE  
Ski-U-Mah  The Commons Hotel

Kathleen Harder, University of Minnesota  
What’s the Robot Saying? Designing Healthcare Robots to Interface with Patients  
Zane Thimmesch-Gill  
University of Minnesota  
Regulatory Aspects of Robots in Health Care  
Drew Simshaw  
Georgetown Law’s Institute for Public Representation

NEUROENGINEERING 2: NEW TECHNOLOGIES & APPLICATIONS  
Meridian Ballroom 1  The Commons Hotel

Session Organizers:  
Tamer Akkin, University of Minnesota  
Tay Netoff, University of Minnesota

DEFT: Dexterous Hand Control through Fascicular Targeting  
Edward Keffer  
Nerves Incorporated  
Molecular Neurotechnologies  
Daniel Schmidt  
University of Minnesota  
The Argus II Retinal Prosthesis Results at the University of Minnesota  
Sandra Rocio Montezuma  
University of Minnesota
Tuesday, April 12, 2016

DRUG DELIVERY DEVICES  
Thomas H. Swain Room  
McNamara Alumni Center  
Session Organizers:  
Ron Siegel, University of Minnesota
Jeffrey Borenstein, Charles Stark Draper Laboratories

A Microfluidic Drug Delivery System for Treatment and Prevention of Hearing Loss
Murtaza Lakdawala, University of Minnesota
Karen Kaehler, University of Minnesota
Paul Galm, Zurich Medical Technologies
Karen Kaehler, University of Minnesota
Randy Nelson, Evergreen Medical Technologies, Inc.

Revolutionary Treatment Based on Drug-Device Convergence
Randy Nelson, Evergreen Medical Technologies, Inc.
Robert Bailen, Washington University in St. Louis
Mike Finch, Childrens Hospitals and Clinics
John Hauck, University of Minnesota

NEUROMODULATION CLINICAL TRIALS  
Meridian Ballroom 1  
The Commons Hotel  
Session Organizer:  
Kip Ludwig, Mayo Neural Engineering Laboratories

Neuromodulation Clinical Trial Landscape: Lessons Across Modalities
Kip Ludwig, Mayo Neural Engineering Laboratories

Neuromodulation Trial Design in an Era of Change
Eric Lovett, Sunshine Heart

Hypoglossal Nerve Stimulation for Treatment of Obstructive Sleep Apnea
Quan Ni, Inspire Medical Systems

EMERGING MEDICAL INNOVATION VALUATION COMPETITION  
Meridian Ballrooms 2/3  
The Commons Hotel  
Session Organizers:  
Randy Nelson, Evergreen Medical Technologies, Inc.
Mike Finch, Childrens Hospitals and Clinics

InVitro Select
Huy Lam Huy, Washington University in St. Louis
Robert Bailen, Washington University in St. Louis

Fixx Orthopedics
Tom Gerold, Fixx Orthopedics

Force-Sensing Sleeve for Laparoscopic Surgery
Justin Wee, Hospital of Sick Children

TA VR without CT
Mike Singer, Stenomics, Inc.

GaitAssist
Yu Xu, Johns Hopkins University

Wellwise
Jeremiah Gerdin, University of Minnesota
Murtaza Lakdawala, Wellwise

Judges:  
Mike Finch, Childrens Hospitals and Clinics
Paul Galm, Zurich Medical Technologies
Karen Kaehler, University of Minnesota
Randy Nelson, Evergreen Medical Technologies, Inc.

WEARABLES 1  
Meridian Ballroom 4  
The Commons Hotel  
Session Organizers:  
Lucy Dunne, University of Minnesota
Lars Odosson, University of Minnesota

Real-world Wearable Rehabilitative Technology for Kids with Disabilities
Michele Lobo, University of Delaware

Active Materials Technology for Wearable Systems
Brad Holshchuh, University of Minnesota

A New Wearable Technology for Gait Training
Charlotte Brenteson, North Memorial Medical Center
John Hauck, Lite Run, Inc.
Doug Johnson, Lite Run, Inc.

Effects of Ready-to-Wear Sizing Conventions on Sensor Placement for Medical Wearable Sensing
Crystal Compton, University of Minnesota
Linsey Griffin, University of Minnesota

FUTURE OF CARDIAC PACING  
A.J. Johnson Great Room  
McNamara Alumni Center  
Session Organizer:  
John Schoenhard, CentraCare Heart & Vascular Center

Leadless Pacemaker: Disruptive Innovation or Market Cannibalization
Mike Eggens, Medtronic, Inc.; University of Minnesota

Device Lifecycle Management and Cremation of a Leadless Pacemaker
Mike Eggens, Medtronic, Inc.; University of Minnesota

The Ultimate Leadless Pacemaker: Biological Pacemaker
Vinedo Sharma, Medtronic, Inc.

CPT: Current Status and Future Possibilities
David Benditt, University of Minnesota

CARDIAC VALVE THERAPY DEVELOPMENT IN THE TRANSCATHETER AGE  
Ski-U-Mah  
McNamara Alumni Center  
Session Organizer:  
Michael Bateman, Medtronic, Inc.

Anatomical Characterization: The Foundation of Successful Heart Valve Development
Michael Bateman, Medtronic, Inc.

Hydrodynamic and Mechanical Testing for Transcatheter Heart Valves: Can Industry Do More to Improve Patient Safety?
Ajit Yoganathan, Georgia Institute of Technology

The Challenges Surrounding Preclinical Testing in Transcatheter Device Development
Michael Conforti, American Preclinical Services

First In Man: Bringing Transcatheter Technologies to Clinical Trials
Paul Sorajja, Abbott Northwestern Hospital

CM&RS 2: ADVANCES IN HEART MODELING AND CARDIOVASCULAR INTERVENTIONS  
Thomas H. Swain Room  
McNamara Alumni Center  
Session Organizers:  
Marc Horner, ANSYS, Inc.
Dawn Bardot, Medical Devices Innovation Consortium

Fluid-Structure Interaction Simulation of Cardiac Leads in the Heart: Developing a Computational Model for use in Medical Device Design (DMD2016-8302)
Hakizumwami Birali Runesha, University of Chicago

Comparative Fluid-structure Interaction Model of Tricuspid and Bicuspid Aortic Valves
Kai Cao, University of Notre Dame

Living Heart Human Model: Cardiovascular Stent Deployment and Cardiac Cycle Simulation (DMD2016-8458)
Brian Baillargeon, Dassault Systèmes SIMULIA

Participating Companies:  
BOSTON SCIENTIFIC  
www.bostonscientific.com

CRI  
www.cri-devices.com

MINNESOTAWORKS.NET  
www.minnesotaworks.net

MATERIALISE  
www.materialise.com

OLYMPUS SURGICAL TECHNOLOGIES OF AMERICA  
www.medical.olympusamerica.com

SCANLAN GROUP  
www.scanlan.com

STARKEY HEARING TECHNOLOGIES  
www.starkey.com

STELLAR TECHNOLOGIES, INC.  
www.stellar-technologies.com

VASCULAR SOLUTIONS  
www.vasc.com

WARE TECHNOLOGY SERVICES  
www.warets.com

STUDENT DESIGN SHOWCASE  
University Hall  
McNamara Alumni Center  
Session Organizer:  
Dawn Bardot, Medical Devices Innovation Consortium

The purpose of this showcase is to promote and publicize excellence in medical device design by teams of undergraduate and graduate students.

See pages 10 for more details

7:30 p.m.  ADJOURN
**Wednesday, April 13, 2016**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m.</td>
<td>Registration and Continental Breakfast</td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td>Meridian Ballrooms 2/3  The Commons Hotel</td>
</tr>
</tbody>
</table>

**THREE-IN-FIVE COMPETITION**

**Competition Chair:** Bryce Beverlin III, Medical Devices Center  
**Design of a Low-cost Social Robot for Children with Complex Communication Needs (DMD2016-8444)**  
Eric Wade  
University of Tennessee

A Novel Device and Technique for Trauma-Related Tube Thoracostomy (DMD2016-8303)  
Shannen Kizilski  
Massachusetts Institute of Technology

A Device to Quantify Lung Compliance and Edema (DMD2016-8501)  
Lars Mattison  
University of Minnesota

An Ultraportable Device Platform for Aseptic Surgery in Field Settings (DMD2016-8377)  
Christopher Murray  
Harvard Medical School

A Muscle-powered Counterpulsation Device for Tether-free Cardiac Support: Form and Function (DMD2016-8311)  
Dennis Trumble  
Carnegie Mellon University

A Device for Enabling Placement of Intra-Osseous Infusion Tools (DMD2016-8447)  
Steven Reinitz  
University of Minnesota

A Single Incision Delivery Tool for Epidermal Pacing and Defibrillation (DMD2016-8398)  
Justin Opfermann  
Children’s National Medical Center

Smartphone-Enabled Flow Monitoring Device for Peripheral Artery Disease (DMD2016-8483)  
Kevin Wu  
The University of Georgia

Design of an Ergonomic Wheelchair Drive System for Improved Shoulder Biomechanics (DMD2016-8487)  
Gary Goldish  
Minnesota VA Health Care System

Design and Modelling of a Passive Hydraulic Device for Muscle Spasticity Simulation (DMD2016-8471)  
Jiahui Liang  
University of Illinois at Urbana-Champaign

**JUDGES:**  
Scott Augustine, Augustine Biomedical + Design  
David Black, Schwegen Lundberg & Woessner, P.A.  
Bryan Clark, Boston Scientific Corporation  
David Darrow, University of Minnesota  
Mike Finch, Children’s Hospitals and Clinics  
Michael Hoey, NCTera Inc.  
Tom KraMer, Kablooe Design  
TheoNed Netolf, University of Minnesota  
Kate Taylor, Entarik  
Meghan Thorne, Devices by Nortech

**CM&RS 3: VIRTUAL PATIENTS IN CLINICAL TRIALS**

**Session Organizers:**  
Marc Horner, ANSYS, Inc.  
Dawn Bardon, Medical Device Innovation Consortium

**Incorporation of Stochastic Engineering Models as Prior Information in Bayesian Medical Device Trials**  
Tarek Haddad  
Medtronic Cardiac Rhythm and Heart Failure

**CM&RS 3: continued**

**Augmenting a Clinical Study with Virtual Patient Models: FDA and Industry Collaboration (DMD2016-8460)**  
Adam Himes  
Medtronic Cardiac Rhythm and Heart Failure

**In Silico Imaging Methods within a Virtual Imaging Clinical Trial for Regulatory Evaluation**  
Aldo Badano  
U.S. Food and Drug Administration

Charles Tedionio  
University of Minnesota

**WEARABLES 2**

**Meridian Ballrooms 2/3**  
Lucy Dunning, University of Minnesota  
Lars Oddsson, University of Minnesota

**Health in Motion: Revolutionizing Patient Care with Intelligent Wearable Technology & Game-based Therapies**  
Bijan Najafi  
Baylor College of Medicine

**Cables in Motion**  
Paul Wagner  
Minnesota Wire

**A Wearable Sensory Prosthesis to Improve Balance**  
Lars Oddsson  
RXFunction, Inc.

**Design and Analysis of a Sensor Enabled In-ear Device for Physiological Monitoring**  
Kira Erickson  
University of Minnesota

**USABILITY OF MEDICAL DEVICES**

**Meridian Ballroom 4**

**Session Organizer:**  
Richard Stein, British Standard Institute

**Panel Session: The Impact of Breakthrough Technologies on the Usability of Medical Devices**

**Serge Dubeau**  
Northeastern University

**Worrell**  
UL-Wilkund

**Andrea Dwyer**  
Dean Hooper  
HEConsulting

**Jessica Willing-Pich**  
Xmedica

**Microfluidic Medical Devices**

**Ski-U-Mah McNamara Alumni Center**

**Session Organizer:**  
Matthew Putnam, Mayo Clinic Ventures

**Moderator:**  
Andrew Hansen, University of Minnesota

**Microenvironmental Control with Microfluidics**  
David Eddington  
University of Illinois at Chicago

**Point-of-Care Diagnostics**  
Jacqueline Linnes  
Purdue University

**Biophysical Markers of Clinical Severity in Sickle Cell Disease**  
David Wood  
University of Minnesota

**Orthopedic Devices: Emerging Designs & Development Strategies**

**McNamara Alumni Center**

**Session Organizers:**  
Louise Bechtold, Hennepin County Medical Center  
Jacqueline Geisler, Hennepin County Medical Center  
Matthew Putnam, Associated Community Medical Centers

**Making the case for New Orthopaedic Products**: What is required to be a real benefit?  
Matthew Putnam  
Affiliated Community Medical Centers

**Orthopedist’s Perspective on the Introduction of Medical Devices and the Role of Early Testing**  
Marc Tompkins  
TRIA Orthopaedic Center

**Emerging Designs and Development Strategies**

**James Kent**  
FocusStart, LLC

**Panel Discussion**  
(Jacqueline Geisler, moderator):  
Matthew Putnam, Marc Tompkins  
James Kent, and Pat Dillon (SBIR/STTR)

**Wheelchair Technologies**

**McNamara Alumni Center**

**Session Organizers:**  
Elizabeth Hsiao-Wecksler, University of Illinois at Urbana-Champaign  
Andrew Hansen, University of Minnesota

**Using Developing World Constraints to Create a Global Wheelchair Product**  
Amos Winter  
Massachusetts Institute of Technology

**From the Lab to Market: Applying the Scientific Method to Commercializing Medical Devices**  
Scott Daigle  
IntelliWheels, Inc.

**Keynote & Awards Luncheon**

**McNamara Alumni Center**

**Sponsored by Medtronic, Inc.**

**Moderator:**  
Paul laizzo, University of Minnesota

**Presentation of Emerging Medical Innovation Valuation Competition Awards by Randy Nelson, Evergreen Medical Technologies, Inc.**

**Lessons in Medical Device Innovations**  
Manny Villaña, Medical 21, Inc.

**Presentation of Emerging Medical Innovation Valuation Competition Awards by Randy Nelson, Evergreen Medical Technologies, Inc.**

**Presentation of Emerging Medical Innovation Valuation Competition Awards by Randy Nelson, Evergreen Medical Technologies, Inc.**

**Sponsors:**  
Mead Medical, Sacred Heart Medical Center  
FocusStart, LLC
Wednesday, April 13, 2016

WHEELCHAIR TECHNOLOGIES
Development of an Ergonomic Wheelchair for Improved Shoulder Biomechanics
Andrew Hansen
University of Minnesota

MATERIALS FOR HEART VALVE LEAFLETS

Session Organizers: The Commons Hotel
Meridian Ballroom 4
Peter Edelman, Boston Scientific Corporation
Bob Tranquillo, University of Minnesota

A Hybrid Approach to Heart Valve Tissue Engineering
Arash Kheradvar
University of California, Irvine

Characterizing Bioprosthetic Valve Materials: A Critical Step for Valve Enhancements
Cindy Clague
Medtronic Coronary & Structural Heart

Off-the-Shelf Tissue-engineered Valves Grown in Vitro
Bob Tranquillo
University of Minnesota

Development of a Trilayered Nanofibrous Substrate for Heart Valve Leaflet Generation
Soumen Jana
Mayo Clinic

MEDICAL DEVICE INNOVATION OUTSIDE THE U.S.

Session Organizers: McNamara Alumni Center
Meridian Ballroom 4
Dale Wahlstrom, Act 3, LLC
Sarah Walbert, Minnesota Trade Office

Panel Discussion:
Asa Runnäs
Symbioteq
Sudesh Sivarasu
University of Cape Town, Medical School
Nikhil Murdeshwar
Olympus Surgical Technologies America
Chuck Brynelsen
Spring Rock Ventures
Ralph Cardinal
Boston Scientific Corporation

CM&S4: VERIFICATION AND VALIDATION: A PATHWAY TO ESTABLISH CREDIBLE COMPUTER MODELS

Session Organizers: McNamara Alumni Center
Mark Horner, ANSYS, Inc.
Dawn Bardot, Medical Device Innovation Consortium

Challenges in Establishing Credibility for Simulations in Medical Device Design
Jeff Rodner
Medtronic Neuromodulation

What Can we Learn from Code Verification: The V&V40 Challenge Problem
Travis Schauer
Boston Scientific Corporation

A Bridge for the ‘Leap of Faith’ with Computational Models
Pras Pathmanathan
U.S. Food and Drug Administration

Overview of the ASME V&V40 Standard on V&V in Computational Modeling of Medical Devices, with Examples
Jeff Bischoff
Zimmer

ADVANCES IN MEDICAL DEVICES 2

Session Organizer: McNamara Alumni Center
Thomas H. Swain Room
Matthew Johnson, University of Minnesota

Variable Series Elasticity Control of a Pneumatically Actuated Transistibial Prosthesis (DMD2016-8465)
Moei Wu
The University of Alabama

Robot for MRI-Guided Focal Prostate Laser Ablation (DMD2016-8442)
Alexander Squires
The University of Georgia

Establishing the Feasability of a Sensor-Based Sock Management System (DMD2016-8327)
Marian El-Khatib
Minneapolis VA Health Care System

Unobtrusive Monitoring Respiration during Sedentary Behavior Using a Pressure Sensing Mat (DMD2016-8374)
Hyoki Lee
Baylor College of Medicine

CONCURRENT TECHNICAL SESSIONS

SPONSOR EXHIBIT SHOWCASE

PROSTHETICS & ORTHOTICS

Session Organizers: The Commons Hotel
Meridian Ballroom 1
Andrew Hansen, University of Minnesota
Elizabeth Hsiao-Wecksler, University of Illinois at Urbana-Champaign

Experience and Evidence - Evolution of a Custom Carbon Fiber Device to Restore Limb Function
Jason Wilken
DoD- VA Extremity Trauma & Amputation Center of Excellence

Portable Powered Ankle-Foot Orthosis (PPAFO) Tested for Gait Initiation and Assistance
Elizabeth Hsiao-Wecksler
University of Illinois at Urbana-Champaign

Additive Manufacturing: Enabling a Personalized Medicine Approach to Prosthetic and Orthotic Device Management
Elisa Arch
University of Delaware

SURGICAL ROBOTS & COMPUTATIONAL SURGERY

Session Organizer: The Commons Hotel
Meridian Ballrooms 2/3
Tim Kowalewski, University of Minnesota

Magnetic Resonance Imaging-Guided Robotic Catheter System for Atrial Fibrillation Ablation
Cenk Cavusoglu
Case Western Reserve University

How Can Surgical Robots Help in Neurosurgery? Uzma Samadani
University of Minnesota

Hyperelastic Soft Catheter Robots
Mark Gilbertson
University of Minnesota

Towards 3D Printing on Moving Human Anatomy
John O’Neill
University of Minnesota

Towards Closed Loop Control of Fiber Optic Surgical Lasers
Darrin Beekman
University of Minnesota

ENGINEERED VEIN VALVES

Session Organizer: The Commons Hotel
Bob Tranquillo, University of Minnesota

VENOUS VALVE DESIGN AND VERIFICATION TESTING

David Ku
Georgia Tech

The calf Muscle Pump and Chronic Venous Insufficiency
Rumi Faizer
University of Minnesota

Transcatheter Tissue-engineered Valve Valve
Zeeeshan Syedan
University of Minnesota

VENOUS VALVES: Who Will Benefit?
Jeff Vogel
Medtronic, Inc.

ADVANCES IN CARDIOVASCULAR MEDICAL DEVICES

Session Organizer: McNamara Alumni Center
Paul Iaizzo, University of Minnesota

Biomechanical Comparison of Human and Swine Cardiovascular Tissues (DMD2016-8310)
Ashish Singal
University of Minnesota

A D-shaped Bileaflet Bioprosthesi which Replicates Physiological Left Ventricular Flow Patterns (DMD2016-8329)
Sean Tan
National University of Singapore

Transcutaneous Energy Transfer and Inductive Communications for VAD Systems (DMD2016-8424)
Aaron Bartnik
Minnetronics, Inc.

Intra-cardiac Magnetic Resonance Imaging Catheter with Origami Deployable Mechanisms (DMD2016-8481)
Alex Squires
The University of Georgia

ADVANCING US EARLY FEASIBILITY STUDIES FOR INNOVATIVE MEDICAL TECHNOLOGY

Session Organizer: McNamara Alumni Center
Bill Murray, Medical Device Innovation Consortium

EFS Strategy and Perspective
Angela Mallory

MONA LSA Thoracic Branch Early Feasibility Pilot IDE
Vicki Pearson
Medtronic, Inc.

MDIC Blueprint for Early Feasibility Study Success
Karim Benali
Abiomed

5:15 p.m. - 6:45 p.m.
DQ Club Room, TCF Bank Stadium

SCIENTIFIC POSTER SESSION

Enter through Premium Entrance under Benton County on the SW side of TCF Bank Stadium Shuttles available to and from The Commons Hotel
A complete list of titles & authors are on pages 12-15.

15TH ANNIVERSARY CELEBRATION

6:45 p.m. - 8:30 p.m.
Indoor Club Room, TCF Bank Stadium

8:30 p.m.
ADJOURN
Emerging Technology Forum
“3D Printed Bionic & Medical Devices”
Welcome and Introductions:
Michael McAlpine, University of Minnesota
Meridian Ballrooms 2-4
The Commons Hotel

KEYNOTE SPEAKERS:
3D Bioprinting for Tissue Engineering and Transplantable Organs
Angela Panoskaltsis-Mortari
University of Minnesota

3D Printed Patient Specific Devices
Scott Hollister
University of Michigan

How 3D Printing Helps the Surgeon Repair Complicated Congenital Heart Defects
Erle Austin
University of Louisville Hospital

3D Printed Bionic Nanodevices
Michael McAlpine
University of Minnesota

ADVANCES IN MEDICAL DEVICES 3
Session Organizer:
Matthew Johnson, University of Minnesota
Moderators:
Oleg Vesnovsky, U.S. Food and Drug Administration

A Low-Cost, Fully Programmable, Battery Powered Direct Cortical Electrical Stimulator (DMD2016-8303)
An Do
University of California, Irvine

Evaluating Accuracy of Digital Thermometers Using a Tissue Phantom Mimicking Normal and Fever Environments (DMD2016-8343)
Oleg Vesnovsky
U.S. Food and Drug Administration

Design and Development of a Rat Peritoneal Infusion Device for Oxygen Microbubble Bolus Delivery (DMD2016-8326)
Liana Hatoum
University of Nebraska-Lincoln

Pneumatic Sleeve Orthosis for Lofstrand Crutches: Application of Soft Pneumatic FREE Actuator (DMD2016-8486)
Chen-Zhang Xiao
University of Illinois at Urbana-Champaign

ADVANCES IN MEDICAL DEVICES 4
Session Organizer:
Matthew Johnson, University of Minnesota
Moderators:
Jenna Gorlewicz, Saint Louis University

Design and Analysis of a Bimanual Multifunctional Robot for NOTES (DMD2016-8308)
Tao Shen
University of Nebraska-Lincoln

A Resectoscope for Robot-Assisted Transurethral Surgery (DMD2016-8334)
Nima Sarli
Vanderbilt University

Development of a Surgical Tool for Off-Pump Deployment of a Ventricular Assist Device (DMD2016-8428)
Ryan Stanfield
University of Utah

Design of a Steerable Guide for Laser Interstitial Thermal Therapy of Brain Tumors (DMD2016-8336)
Jenna Gorlewicz
Saint Louis University

12:00 p.m.
LUNCHEON KEYNOTE AND AWARDS
Sponsored by St. Jude Medical
Moderator: Arthur Erdman, University of Minnesota
Presentation of the Three-in-Five Competition Awards by David Black, Schwegman Lundberg & Woessner, P.A.
From 3DP to Bio-3DP - Challenges & Opportunities
Wei Sun,
Drexel University & Tsinghua University
(Keynote lunches are a separate billable event, meal tickets are required.)

TOURS DEPART
Immediately following the Keynote Luncheon, guided tours will depart from the back of Memorial Hall. Tour descriptions can be found on pg 9.

2:00 p.m.
ADJOURN
GUIDED TOURS

Tours are Thursday, April 14 at 2:00 p.m. and will depart from Memorial Hall, McNamara Alumni Center. Please sign-up at the conference registration desk before 12:00 p.m. on Thursday, April 14.

**Characterization Facility (CharFac)**

The Characterization Facility provides academic and industrial partners access to state-of-the-art characterization methods which measure material properties from the micron-to the sub-nanometer scale. Our staff has extensive experience with the materials characterization of medical devices using light, x-rays, scanning probe and electron beam methods. We do both open research and proprietary work, and can perform the experiments for you or train you on the use of our extensive instrumentation: scanning and transmission electron microscopes, x-ray scattering/diffraction, Raman and Infrared spectroscopy and microscopy, surface analytical along with an extensive range of atomic force microscopy and nano-indentation methods.

**Additional Tour Times:**

Wednesday, April 15 at 10:00 a.m., departing from The Commons Hotel Registration Desk

**Experimental Surgical Services (ESS)**

At Experimental Surgical Services, we are experts in designing and conducting the appropriate research to determine the safety and efficiency of medical devices. We have more than 25 years of experience in pre-clinical assessment for the medical industry. In fact, we are the industry leader in researching and testing cardiac devices and surgical techniques. Over 500 open heart procedures and 1,500 procedures are completed annually. ESS is directed by Richard Bianco who has more than 25 years of experience in the pre-clinical assessment of virtually every animal model. The ESS in-house surgeons work with device companies to develop and validate research methods, provide consultation as necessary and offer interpretative and technical support.

**Interactive Visualization Lab (IV Lab)**

Interactive Visualization Lab research involves data visualization, computer graphics, and human-computer interaction. Current projects include visualization of time-varying (motion) data, large-scale data visualization, perceptually optimized visualization, 3D user interfaces, haptics, and pen and multi-touch input techniques. Our work is supported by the National Science Foundation, National Academies Keck Futures Initiative, grants from industry, and the University of Minnesota.

The research group includes about 10 undergraduate and graduate students. The IV Lab in Keller Hall is equipped with high-end graphics workstations that drive a series of innovative visual displays and interactive devices. Major equipment includes a Multi-Surface, Multi-Touch Virtual Reality Environment and a 3D Haptic (Force-Feedback) Display. We also work regularly with the visualization facilities at the Minnesota Supercomputing Institute.

**Medical Devices Center (MDC)**

The University of Minnesota Medical Devices Center is dedicated to advancing medical device innovation through creating new knowledge and educating the next generation of medical device innovation leaders. The MDC is a unique interdisciplinary program that resides within the Institute for Engineering in Medicine. The MDC aims to strengthen interdisciplinary research among faculty in the health sciences and engineering in areas specifically related to medical devices. The center trains the next generation of medical device inventors (including the Innovation Fellows Program) and fosters new relationships with the medical device industry and government agencies to improve health care worldwide. This tour will highlight the brand new 8,000 square ft. facility that is configured to promote interdisciplinary medical device development including needs assessment, creative brainstorming, prototyping and testing.

**Additional Tour Times:**

Tuesday, April 14 and Wednesday, April 15 at 10:00 a.m. & 3:30 p.m., departing from The Commons Hotel Registration Desk

**Minnesota Nano Center (MNC)**

The Minnesota Nano Center is a state-of-the-art facility for interdisciplinary research in nanoscience and applied nanotechnology. The center offers a comprehensive set of tools in two clean rooms for fabricating new micro- and nanoscale devices, such as integrated circuits, advanced sensors, and microfluidic systems. The MNC is also equipped to support nanotechnology research that spans many science and engineering fields, in areas as diverse as cell biology, high performance materials, and biomedical device engineering. This interdisciplinary work takes place in two new specialized labs to support interdisciplinary research in bio-nanotechnology and nano/micrometer-scale materials. Tour attendees will see the Nano Center's new class 10 clean room and its fabrication tools, as well as our new applications labs devoted bio-nanotechnology and nanomaterials. PLEASE NOTE: Attendees will be required to wear clean-room coveralls and boots during this tour, please dress accordingly in slacks and closed toe shoes only.

**Additional Tour Times:**

Wednesday, April 15 at 10:00 a.m., departing from The Commons Hotel Registration Desk

**The Visible Heart® Laboratory (VH Lab)**

Dr. Paul Iaizzo has been at the University of Minnesota since 1990, performing research and teaching graduate and undergraduate courses. In 1997, Dr. Iaizzo and his co-workers created The Visible Heart® Laboratory in collaboration with Medtronic, Inc. Today, this lab is a premiere place to perform translational systems physiology research that ranges from cellular and tissue studies to organ and whole body investigations. The VH Lab also has a unique human heart library. The VH Lab embodies a creative atmosphere which is energized by some of the best and brightest students at the University. Our lab staff has over 100 years of collective research experience and functions as a highly efficient and productive team.
THANK YOU to the participants of the 7th Annual 5.10k Road Race & Fun Run

The University of Minnesota 2015-16 Medical Devices Center Innovation Fellows and 2016 DMD Conference would like to thank the participants and sponsors of this year’s 5.10k held Monday, April 11. Please join us next year for the 8th Annual 5.10k Road Race & Fun Run.

Special thanks to the 5.10k Sponsors:
- Boston Scientific Corporation
- Minnetronix
- Schwegman, Lundberg, Woessner
- Donatelle
- The Commons Hotel
- Medical Devices Innovation Consortium
- TC Running Company
- TCF Bank
- Brave New Workshop
- Punch Pizza
- Stanley’s Northeast Bar Room
- University Dining Services

Save the Date
Monday, April 10, 2017
www.dmd.umn.edu/5K

---

1. **Intussusception: A Pain in the Butt**
   Molly Berringer, Andrea Caceres, Claire Castaneda and Amanda Smith, The University of Iowa

2. **Search Coil Based Magnetic Biosensor for Multiplex Detection of Disease**
   Kai Wu, Caleb Gunderson, Venkatramana Krishna and Jian-Ping Wang, University of Minnesota

3. **Reinforced Glove for Interphalangeal Joint Laxity Disorders**
   Ben Eilers, Reinhold Jones, Tony Leonard and Tyler Pospisil, University of Iowa

4. **BeatBox: A Novel Device for More Realistic Pulse Simulation**
   Jason Brooks, Hiral Doshi, Catherine Jameson, Julia Jenjewa and Carina Thunell, Yale University

5. **A Novel Gallbladder Chemoablation and Implosion Protocol for Gallstone Treatment**
   Druv Bhagavan, Amy Chang and Julie Chang, Jessica Lee and Olga Wroblewski, Yale University

6. **Novel Needle and Image Guidance System for Bone Marrow Aspiration and Biopsy**
   Deeksha Deep, Xuan-Truc Nguyen, Jack Olivarius-McAllister, Ryan Smith and Blake Thomson, Yale University

7. **NVIP Transplant: Improving the Post-Transplant Experience**
   Zobia Chunara, Marion Hirshberg, Joshua Isenstein, Andrea Mak, Micah Rosales, David Mulligan, Joseph Zinter and Ying Zheng, Yale University

8. **Blood Pressure Measurement Device for Low-Resource Settings**
   Jungsoo Chang, Lauren Kennedy, Si Long Tou and Caroline Soyars, University of Michigan; Thomas Konney and Cornelius Turpin, Komfo Anokye Teaching Hospital; Kathleen Stienko, University of Michigan

9. **Self-Retaining Inguinal Surgical Retractor**
   Carl Beranek, Sarah Coe, Mollie Knake and Kevin Midlash, University of Iowa

10. **True Lumen CTO Crossing: The Final Frontier of PAD**
    Jacob Gill, Marlene Hagen, Marcus Malecek, Nicholas Marco, Caleb Myhre and Corey Stader, United States Air Force Academy

11. **The Open Gauntlet**
    Kelli Fuchs and Austin Carter, University of Minnesota Duluth

12. **A Pulse Oximeter for Use During Minimally Invasive Fetal Surgery**
    Claudia Iriondo, Thomas Loughlin, Samir Saidi and Kathryn Wallace, Rice University

13. **Redesigned Pediatric Stent Removal**
    John Chen, Valerie Pinillos, Margaret Watkins, Eric Yin and Allen Zhao, Rice University

    Jie Hyuk Byun, Adam Ferguson, John Michael Frullo and Paul Greenfield, Rice University

15. **Reimagining the Modern Infusion Pump**
    Joao Ascensao, Gabrielle Fatrona, Paulina Popek, Katie Powers and William (Xiaolin) Zhu, Rice University

---

MEDICAL DEVICE INNOVATION WORKSHOP

“BECOMING A MEDICAL TECHNOLOGY INNOVATOR”

We would like to thank all of the attendees who participated in the 2016 Medical Device Innovation Workshop!

Special thanks to the 2016 Innovation Workshop presenters:
- Susan Alpert, SFA Consulting LLC
- William Durfee, University of Minnesota
- Mike Finch, University of Minnesota
- Michael Hoey, NxThera Inc.
- Paul Iaizzo, University of Minnesota
- Barry Kudrowitz, University of Minnesota
- Tim Laske, Medtronic AF Solutions
- John Mack, Medtronic
- Robert Wilson, University of Minnesota

Save the Date
Monday, April 10, 2017
www.dmd.umn.edu/workshop

---

STUDENT DESIGN SHOWCASE

5:30 p.m. - 7:30 p.m.                                                                                                                  University Hall, McNamara Alumni Center
Design of Medical Devices Conference, China
China National Convention Center
Beijing, China

November 7-9, 2016

Program details coming soon!
www.dmd.umn.edu/dmd_china

DMD HAS GONE MOBILE!

Complete the DMD Attendee Survey by May 1, 2016!
Your input is greatly appreciated!
As a thank you for your participation, we will randomly draw two names from the pool of those who have successfully submitted the survey. The winners will receive
(1) Complimentary Registration to the 2017 DMD Conference
The winners will be chosen and notified shortly after the survey closes.

Scan to download!
1. Cable Driven Two Degrees of Freedom Ankle-foot Prosthesis² (DMD2016-8304)
Evandro Ficanza and Mohammad Rastgaar Aaghaei, Department of Mechanical Engineering-Mechanics, Michigan Technological University; Kenton Kaufman, Department of Orthopedic Surgery, Mayo Clinic and Mayo Foundation University; Nathan Bills and Dmitry Oleynikov, Center for Advanced Surgical Support: Form and Function

Mark Wierzbicki and Jesse Bryant, Department of Biomedical Engineering, Texas A&M University; Matthew Miller, Texas Institute for Preclinical Studies, Texas A&M University; Brandis Keller and Duncan Maitland, Department of Biomedical Engineering, Texas A&M University

3. Evaluation of Premium Ultrasound Systems with Sonographers: How Comparative Usability Testing can Reveal Human Factors Issues Prior to Errors in the Exam Room¹ (DMD2016-8306)
Annelies Tosine and Hala Al-Jaber, User Experience Research, Macadamian Technologies

4. A Muscle-powered Counterpulsation Device for Tether-free Cardiac Support: Form and Function¹ (DMD2016-8311)
Dennis Trumble, Department of Biomedical Engineering, Carnegie Mellon University

5. Thombogenicity Testing for Blood-Contacting Medical Devices in an in vitro Ovine Blood-Loop¹ (DMD2016-8312)
Kent Grove, Steve Deline, Tim Schatz, Sarah Howard and Mark Smith, American Preclinical Services

6. Peritoneal Membrane Oxygenation Therapy for Rats with Acute Respiratory Distress Syndrome¹ (DMD2016-8313)
Nathan Legband and Lanna Hatoum, Department of Mechanical and Material Engineering, University of Nebraska-Lincoln; Alec Thomas, Department of Mechanical Engineering, University of Colorado-Boulder; Craig Kreikemeier-Bower, Institutional Animal Care Program, University of Nebraska-Lincoln; Douglas Hostetler, Department of Veterinary Medicine and Biomedical Sciences, University of Nebraska-Lincoln; Keely Bueing, Department of Surgery, University of Nebraska Medical Center; Mark Borden, Department of Mechanical Engineering, University of Colorado-Boulder; Benjamin Terry, Department of Mechanical and Material Engineering, University of Nebraska-Lincoln

7. Curving Clinical Biopsy Needles: Can We Steer Needles and Still Obtain Core Biopsy Samples² (DMD2016-8314)
Patrick Wellborn, Philip Swaney and Robert Webster III, Department of Mechanical Engineering, Vanderbilt University

8. A Novel Endoscopic Clipping Device for Closing Gastrointestinal Perforation¹ (DMD2016-8318)
Chengli Song, Shuchen Ge, Mingliang Li, Shiju Yan and Yu Zhou, Shanghai Institute for Minimally Invasive Therapy, School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology

Elaine Soohoo, Hsuan Ma and Anne Acolad, Department of Biomedical Engineering, Carnegie Mellon University; Dennis Trumble, Department of Biomedical Engineering, Carnegie Mellon University; Left Field Cardiac, Inc.

10. Identifying Biomarkers for Intracranial Pressure Changes in the Development of a Noninvasive Monitoring Device¹ (DMD2016-8324)
Jeff Hawks, Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln; Greg Bashford, Department of Biological Systems Engineering, University of Nebraska-Lincoln; Sachin Kedar, Department of Neurological Science, University of Nebraska Medical Center; William Thorell, Department of Neurosurgery, University of Nebraska Medical Center; Deepa Ghate, Department of Ophthalmology and Visual Sciences, University of Nebraska Medical Center

Steven Deline, Tim Schatz, Kent Grove, Sarah Howard and Mark Smith, American Preclinical Services

Oleg Vesnovskiy and Matthew Di Prima, US Food and Drug Administration; Timmie Topolewski, US Food and Drug Administration, University of Maryland Baltimore County; Paul Kovacs, Electrochemistry/Biocompatibility Consultant

13. Transcatheter Endovascular Aortic Repair [TEAR]¹ (DMD2016-8333)
Michael Tradewell, Medical School, University of Minnesota; Jaron Olsoe and Brett Andersen, College of Science and Engineering, University of Minnesota; Ashish Singal, Biomedical Engineering, Department of Surgery, Medical Devices Center, Cardiovascular Division, University of Minnesota; Rumi Fatzer, Department of Surgery, Division of Vascular Surgery, University of Minnesota

Wanchuan Xie and Benjamin Terry, Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln

15. Structural Changes of Small Intestine under Compression by Laparoscopic Stapler² (DMD2016-8340)
Yu Zhou, Jingxing Xu, Boting Li, Binbin Ren, Yiyun Jin and Chengli Song, Shanghai Institute for Minimally Invasive Therapy, School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology

16. Design and Analysis of an Antidilation Single-Port Laparoscopic Surgical Device³ (DMD2016-8341)
Rohan Katoch, Mechanical Engineering, Georgia Institute of Technology; Yoshihori Yamakawa, NITI-ON Co. Ltd.; Jun Ueda, Mechanical Engineering, Georgia Institute of Technology; Hiroshi Honda, NITI-ON Co. Ltd.

17. Measurement of the Range of Motion of Laparoscopic Instruments Based on an Optical Tracking System¹ (DMD2016-8342)
Kunyong Lu, Chengli Song, Shanghai Institute for Minimally Invasive Therapy, School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology; Lixiao Yang, Changhai Hospital Affiliated to the Second Military Medical University; Liaoquy Ai and Qin Shi, Shanghai Institute for Minimally Invasive Therapy, School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology

18. Design of a Novel Cable Driven Joint for Laparoscopic Instruments² (DMD2016-8343)
Kunyong Lu, Chengli Song, Xun Zhu and Tong Shen, Shanghai Institute for Minimally Invasive Therapy, School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology

19. A Low-Profile Soft Robotic Sixth-Finger for Grasp Compensation in Hand-Impaired Patients² (DMD2016-8344)
Hong Kai Yap, Graduate School for Integrative Sciences and Engineering, Department of Biomedical Engineering, National University of Singapore; James Cho Hong Gon, Department of Biomedical Engineering, National University of Singapore; Chen-Hua Yeow, Department of Biomedical Engineering, Singapore Institute for Neurotechnology, Advanced Robotics Center, National University of Singapore

20. High Fidelity Medical Training Model Augmented with VR and Conformable Sensors² (DMD2016-8348)
Yunhe Shen, CREST, University of Minnesota; Jack Norfleet, RDECOM, Army Research Laboratory; Zichao Zhao, David Hananel, Daniel Burke, Troy Reihsen and Robert Sweet, CREST, University of Minnesota

21. Low-Cost 3D-Printed Surgical Drill-Guiding Device for MPFL Reconstruction (Pat-Rig)¹ (DMD2016-8350)
Roopam Dey, Orthopaedic Biomechanics Lab, Division of Biomedical Engineering, Department of Human Biology, Faculty of Health Sciences, University of Cape Town; Sarthak Patnaik, Sunshine Hospital, Department of Arthroscopy and Sport Center; Stefan Steinert and Sudesh Sivarasu, Orthopaedic Biomechanics Lab, Division of Biomedical Engineering, Department of Human Biology, Faculty of Health Sciences, University of Cape Town

22. An Ultrasound Trainer for Astronauts¹ (DMD2016-8352)
Jeff Hawks, Carl Nelson and Saideeh Akbarisamani, Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln; Greg Bashford, Department of Biological Systems Engineering, University of Nebraska-Lincoln

23. Telestrative and Telesurgical Application for a Generic Surgical Robot² (DMD2016-8353)
Andrew Pracht, Department of Computer Science and Engineering, University of Nebraska-Lincoln; Nathan Bills and Dmitry Oleynikov, Center for Advanced Surgical Technology, University of Nebraska Medical Center; Benjamin Terry, Center for Advanced Surgical Technology, University of Nebraska Medical Center, Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln

24. A New Gait Data Designed Orthotic for Flatfoot¹ (DMD2016-8356)
Robert Rizza, Department of Mechanical Engineering, Milwaukee School of Engineering; XueCheng Liu, Department of Orthopaedic Surgery, Medical College of Wisconsin

25. Thoracic Volume Follow-up for Growing Rod Surgical Treatment in Early Onset Scoliosis Patients² (DMD2016-8357)
Po-Chih Lee, Department of Mechanical Engineering, University of Minnesota; Charles Ledonio, Department of Orthopaedic Surgery, University of Minnesota; Arthur Erdman, Department of Mechanical Engineering, University of Minnesota; David Polly, Department of Orthopaedic Surgery, University of Minnesota

Po-Chih Lee and Arthur Erdman, Department of Mechanical Engineering, University of Minnesota; Charles Ledonio, Department of Orthopaedic Surgery, University of Minnesota; Evan Bollig, Minnesota Supercomputing Institute, University of Minnesota; David Polly, Department of Orthopaedic Surgery, University of Minnesota

27. A Motion Tracking and IMU-IR Sensor Fusion Module for Medical Simulation¹ (DMD2016-8359)
Yunhe Shen, CREST, University of Minnesota; Kuo-Shih Tseng, College of Science and Engineering, University of Minnesota; Fan Wu, Electrical and Computer Engineering, University of Minnesota
55. Continuous Balance Assessment of Autonomic Nervous System using Time Varying Analysis of Heart Rate Variability¹ (DMD2016-8408) 
Ajay Verma, Department of Electrical Engineering, University of North Dakota; Sergio Cabrera, Department of Electrical and Computer Engineering, University of Texas at El Paso; Reza Fazel-Rezai, Department of Electrical Engineering, University of North Dakota

56. Biochip for Single Cell Analysis using Laser Microfabrication¹ (DMD2016-8409) 
Yasutaka Hanada, Toshio Ono and Keisuke Nemoto, Hiroasaki University

57. A New Parallel External Fixator Design for Correcting Ankle and Foot Sagittal Plane Deformities² (DMD2016-8411) 
Mengqian Sun, Shuai Wang, Bing Li and Zhendong Song, Shenzhen Graduate School, Harbin Institute of Technology; Ying Hu, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences

58. LED Based Hand-held Fluorescence Detector for Quantification of Pyranoïne³ (DMD2016-8414) 
S. Vidyas and Bhaskar Mohan Murari, Department of Biomedical Engineering, School of Bio-Sciences and Technology, VIT University

59. A Study of Backing Line Structure for Intravascular Ultrasound Transducer² (DMD2016-8415) 
Seon Mi Ji, Chan Yuk Park, Jin Ho Sung, Sung Min Kim and Jong Seob Jeong, Department of Medical Biotechnology, Dongguk University

60. A Paradigm for Materials Design for Surgical Simulators, with Specific Application to the Pleura and Needle Decompression² (DMD2016-8416) 
Victor Barocas, Luis Morales Tenorio, Kelsey Devine and Jayme Lee, Department of Biomedical Engineering, University of Minnesota; Robert Sweet, Department of Urologic Surgery, University of Washington; Jack Norfleet and Mark Mazzeo, Army Research Lab

61. Motion Artifact Reduction Algorithm in Wearable Healthcare System² (DMD2016-8420) 
Seung Chul Lee and Sung Min Kim, Research Institute for Commercialization of Biomedical Convergence Technology, Dongguk University

62. Development of a Chronic Wound Healing Device¹ (DMD2016-8422) 
Vigneshwara Siva Santosh Kumar Kadett, Department of Mechanical Engineering, University of Minnesota; Chi Phan, Department of Microbiology and Immunology, University of Minnesota; Alexandra Schauer and Jennifer Granick, Veterinary Clinical Sciences, University of Minnesota; Ryan Hunter, Department of Microbiology and Immunology, University of Minnesota; Peter Bruggeman, Department of Mechanical Engineering, University of Minnesota

63. GaitAssist: A Novel Technology to Mitigate Scissoring Gait in CP Patients² (DMD2016-8423) 
Yu Xu, Department of Biomedical Engineering, Johns Hopkins University; Jacob Schick, Department of Biology, Johns Hopkins University; Kaiyuan Wang and Kevin Xin, Department of Biomedical Engineering, Johns Hopkins University; Alexander de la Vega, Department of Applied Mathematics and Statistics, Department of Physics and Astronomy, Johns Hopkins University; Andie Seabrooke, Michael Ruiz and Ana Ainechi, Department of Biomedical Engineering, Johns Hopkins University; Alexander Hoon, Phelps Center for Cerebral Palsy and Developmental Medicine, Kennedy Krieger Institute; Brittany DeCroes, Department of Outpatient Physical Therapy, Kennedy Krieger Institute; Tara Johnson, Department of Neurology and Developmental Medicine, Kennedy Krieger Institute; Robert Allen, Department of Biomedical Engineering and Department of Gynecology and Obstetrics, Johns Hopkins University

64. A Virtual Reality Haptic Robotic Simulator for Central Venous Catheterization Training² (DMD2016-8428) 
David Pepley, Department of Mechanical and Nuclear Engineering, The Pennsylvania State University; Mary Yovanoff, Department of Industrial Engineering, The Pennsylvania State University; Katelin Mirkin, Hershey Medical Center, The Pennsylvania State University; Scarlett Miller, Department of Industrial Engineering, The Pennsylvania State University; David Han, Hershey Medical Center, The Pennsylvania State University; James Moore, Department of Mechanical and Nuclear Engineering, The Pennsylvania State University

65. Effects of Ready-to-Wear Sizing Conventions on Sensor Placement for Medical Wearable Sensing³ (DMD2016-8429) 
Linsey Griffin and Lucy Dunne, Department of Design, Housing, and Apparel, University of Minnesota

66. Design of a Debridement Device Using Impinging Jets² (DMD2016-8431) 
Ashley Raynal, Cathy Hogan and Ian Hunter, Department of Mechanical Engineering, Massachusetts Institute of Technology

67. Computational Fluid Dynamics Simulations of Blood Flow through an Injured Arteriole² (DMD2016-8433) 
Seth Ireland and Stephen Gent, Department of Mechanical Engineering, South Dakota State University

68. Biomechanical Study on Effects of Struts of Z-shaped Stent-Grafts on Blood Vessel Wall Tissue Layers² (DMD2016-8437) 
Kai Yu, Fanju Hu and Xuelian Gu, Institute for Minimally Invasive Therapy, University of Shanghai for Science and Technology

69. Design of a Dynamic Additive Manufacturing System for use on Free-Moving Human Anatomy¹ (DMD2016-8438) 
Anna French, John O’Neill and Timothy Kowalewski, Department of Mechanical Engineering, University of Minnesota; Robert Kohler and Alexander Nikanorov, Cardiovascular System, Inc.

70. A Wavelet Transform-based Approach to Detecting Postural Transitions in Patients following Anterior Cruciate Ligament Reconstruction² (DMD2016-8439) 
Sadra Hemmati and Eric Wade, Department of Mechanical, Aerospace, and Biomedical Engineering, University of Tennessee

71. In Vivo Assessment of Arterial Compliance of Calcified Regions after Orbital Atherectomy Using Optical Coherence Tomography¹ (DMD2016-8440) 
Tri Nguyen and Rohit Deokar, Department of Mechanical Engineering, University of Minnesota; Robert Kohler and Alexander Nikanorov, Cardiovascular System, Inc.

72. Design of a Low-cost Social Robot for Children with Complex Communication Needs² (DMD2016-8444) 
Christabel Jamiay Vaz and Eric Wade, Department of Mechanical, Aerospace, and Biomedical Engineering, University of Tennessee

73. A Device for Enabling Placement of Intra-osseous Infusion Tools¹ (DMD2016-8447) 
Steven Reinitz, Medical Devices Center, University of Minnesota, Thayer School of Engineering, Dartmouth College; Alexander Slocum, Jr., Department of Surgery, Brigham and Women’s Hospital; Christopher Magoon and Douglas Van Citters, Thayer School of Engineering, Dartmouth College

74. A Pictorial Guide for Enabling Placement of Intra-Osseous Infusion Tools¹ (DMD2016-8448) 
Steven Reinitz, Medical Devices Center, University of Minnesota, Thayer School of Engineering, Dartmouth College; Alexander Slocum, Jr., Department of Surgery, Brigham and Women’s Hospital; Christopher Magoon and Douglas Van Citters, Thayer School of Engineering, Dartmouth College

75. Follow-the-Leader Deployment of Steerable Needles Using a Magnetic Resonance-compatible Robot with Stepper Actuators¹ (DMD2016-8451) 
Bryn Pitt, David Comber and Yue Chen, Department of Mechanical Engineering, Vanderbilt University; Joseph Neimat, Department of Neurological Surgery, Vanderbilt University Medical Center; Robert Webster III and Eric Barth, Department of Mechanical Engineering, Vanderbilt University

76. Acute Perforation Properties of the Right Atrial Appendage² (DMD2016-8452) 
Alexander Mattson, Department of Biomedical Engineering and Department of Surgery, University of Minnesota; Vladimir Grubac, Medtronic; Michael Eggen, Medtronic, Department of Surgery, University of Minnesota; Paul Iaizzo, Department of Biomedical Engineering and Department of Surgery, University of Minnesota

77. Velocity-Limiting Control of an Active Handheld Micromanipulator² (DMD2016-8453) 
Shohin Mukherjee, Robert MacLachlan and Cameron Riviere, The Robotics Institute, Carnegie Mellon University

78. Noninvasive Postmarket Security Monitoring for Medical Devices¹ (DMD2016-8455) 
Benjamin Ransford, Denis Foo Kune, Ann Goochin and Andrew DeOrio, Vira Laboratories, Inc.

79. Force-Sensing Sleeve for Laparoscopic Surgery² (DMD2016-8459) 
Justin Wee, Center for Image Guided Innovation and Therapeutic Intervention, Hospital for Sick Children, Institute for Biomaterials and Biomedical Engineering, University of Toronto; Robert Brooks, Center for Image Guided Innovation and Therapeutic Intervention, Hospital for Sick Children, Department of Mechanical and Industrial Engineering, University of Toronto; Thomas Looi, Georges Azzie, James Drake and Ted Gerstle, Center for Image Guided Innovation and Therapeutic Intervention, Hospital for Sick Children

80. Novel Multi-Scale Frequency Approach to Identify the Pivot Point of the Rotol² (DMD2016-8461) 
Shivaram Poigai Arunachalam and Elizabeth Annoni, Department of Biomedical Engineering, University of Minnesota; Siva Pulipuri and Friedman Paul, Division of Cardiovascular Disease, Mayo Clinic; Elena Tolkacheva, Department of Biomedical Engineering and Department of Surgery, University of Minnesota

81. A Statistical Assessment of Different Coronary Stent Designs² (DMD2016-8461) 
Gabriela de Mattos Veroneze, Department of Industrial Engineering, North Carolina A&T SU, CAPES- Coordenacao de Aperfeicoamento Pessoal de Ensino Superior; Zen Li, Department of Industrial Engineering, North Carolina A&T SU

82. Characterization of Focal Location during High Intensity Focused-ultrasound Ablation in a Tissue Phantom, Using Remote Thermocouple Arrays¹ (DMD2016-8464) 
Sureshendra Devarakonda and Seyed Ahmad Reza Dibaji, Department of Mechanical, Materials Engineering, University of Cincinnati; Prasanna Harihar and Matthew Myers, Division of Solid and Fluid Mechanics, Center for Devices and Radiological Health, US Food and Drug Administration; Rupak Banerjee, Department of Mechanical, Materials Engineering, University of Cincinnati
83. Decay of Tissue Mechanical Properties Over 24 Hour Period² (DMD2016-8466)
Trevor Stephens, Kelsey Harper, Mark Brown and Timothy Kowaleski, Department of Mechanical Engineering, University of Minnesota

84. MRI-Compatible Pneumatic Stepper Motor with Geneva Drive¹ (DMD2016-8467)
Adam Wineland, Yue Chen and ZIon Ts Ho Tse, College of Engineering, The University of Georgia

85. The PhysioCam: Cardiac Pulse, Continuously Monitored by a Color Video Camera² (DMD2016-8468)
Maria Davila and Gregory Lewis, Department of Psychiatry, School of Medicine, University of North Carolina at Chapel Hill; Stephen Borges, Department of Surgery, School of Medicine, University of North Carolina at Chapel Hill, Kinsey Institute, Indiana University

86. A Disposable Robot for Intracerebral Hemorrhage Removal¹ (DMD2016-8469)
Yifan Zhu, Philip Swaney, Isuru Gogade, Ray Lathrop and Robert Webster III, Department of Mechanical Engineering, Vanderbilt University

87. Wearable Coplanar Capacitive Sensor for Measurement of Water Content: A Preliminary Endeavor¹ (DMD2016-8470)
Brant Axt, Song Zhang and Rajesh Rajamani, Department of Mechanical Engineering, University of Minnesota

90. Design of an Ergonomic Wheelchair Drive System for Improved Shouldered Biomechanics² (DMD2016-8477)
Stuart Fairhurst, Minnesota Veterans Medical Research and Education Foundation, University of Minnesota; Eric Nickel and Steve Morin, Minneapolis VA Health Care System; Gary Goldish and Andrew Hansen, Minneapolis VA Health Care System, University of Minnesota

91. In Vitro Evaluations of Cardiac Mapping Catheters Designs and Utilities: Employing Visible Heart® Methodologies² (DMD2016-8478)
Megan Schmidt, Department of Biomedical Engineering and Department of Surgery, University of Minnesota; Michael Franz, Cardiology Division, Veteran Affairs and George Washington University Medical Center; Timothy Laskie, Department of Surgery, University of Minnesota, Medtronic; Mark Stewart, Department of Physical Therapy, Bradley University; Elizabeth Hsiao-Wecksler, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign

92. Smartphone-Enabled Flow Monitoring Device for Peripheral Artery Disease¹ (DMD2016-8485)
Kevin Wu, Stan Gregory, Charles Reader, Bobby Leitmann, Nigel Kojimoto, Kristi Oki, Sheng Jiang, Tyler Wortman and Nevan Hanumathi, Department of Mechanical Engineering, Massachusetts Institute of Technology

93. Rocker Shoes for Natural Immobilization of the Ankle during Single-Limb Support² (DMD2016-8488)
Sara Koehler-McNicholas, Eric Nickel and Charles Schultz, VA Health Care System; Andrew Hansen, VA Health Care System, University of Minneapolis

94. Toward Hand Arthritis Diagnostics Using Smart Phones: Camera Distortion Effect Correction¹ (DMD2016-8490)
Farhad Akhbardeh, Department of Electrical Engineering, University of North Dakota; Fartash Vasefi and Nicholas McKinnon, eTreat Medical Diagnostics, Inc.; Khouyri Tavakolian and Reza Fazel-Rezai, Department of Electrical Engineering, University of North Dakota

95. A Simplified Model for the Assessment of Ex-Vivo Lung Perfusion Methodologies and Treatments¹ (DMD2016-8492)
Lars Mattison, Department of Biomedical Engineering and Department of Surgery, University of Minnesota; John Spratt, Department of Surgery, University of Minnesota; Brian Howard, Department of Biomedical Engineering and Department of Surgery, University of Minnesota; Shany Augustine and Gabriel Loor, Department of Surgery, University of Minnesota; Paul Iaizzo, Department of Biomedical Engineering and Department of Surgery, Institute for Engineering in Medicine, University of Minnesota

96. Design of a Universal Instrumented Wheelchair Hand Rim² (DMD2016-8493)
Alan Gaglio and Jiahui Liang, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign; Scott Daigle and Elizabeth Hsiao-Wecksler, IntelliWheels, Inc.

97. A Novel Phantom Tissue Model for Skin Elasticity Quantification¹ (DMD2016-8494)
Tyler Wortman, Felicia Hsu and Alex Slocum, Department of Mechanical Engineering, Massachusetts Institute of Technology

98. Effects of Grasp Frequency on the Dynamics of a Robotic Surgical Grasper² (DMD2016-8497)
Mark Brown, Trevor Stephens, John O'Neild and Timothy Kowaleski, Department of Mechanical Engineering, University of Minnesota

99. Temporal Discretization Errors Produce Minimal Effects on Vestibular Prosthesis Performance² (DMD2016-8499)
Peter Boutros, Nicolas Valentin and Kristin Hageman, Department of Biomedical Engineering, Johns Hopkins School of Medicine; Dale Roberts and Chenkai Dai, Department of Otolaryngology-Head & Neck Surgery, Johns Hopkins School of Medicine; Charles Della Santine, Departments of Biomedical Engineering and Otolaryngology-Head & Neck Surgery, Johns Hopkins School of Medicine

100. A Device to Aid in Quantifying Lung Compliance and Edema¹ (DMD2016-8501)
Lars Mattison, Department of Biomedical Engineering and Department of Surgery, University of Minnesota; Paul Iaizzo, Department of Biomedical Engineering and Department of Surgery, Institute for Engineering in Medicine, University of Minnesota

101. A Novel Device and Technique for Trauma-Related Tube Thoracostomy² (DMD2016-8503)
Shannon Kizziari, Xiang Zhang, Nigel Kojimoto, Kristi Oki, Sheng Jiang, Tyler Wortman and Nevan Hanumathi, Department of Mechanical Engineering, Massachusetts Institute of Technology

102. Developing a Classification Algorithm for Plantarflexor Actuation Timing of a Powered Ankle-Foot Orthosis² (DMD2016-8505)
Mazharul Islam and Elizabeth Hsiao-Wecksler, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign

103. A Study on Evaluation of Bioabsorbable Anchor (PLGA+β-TCP) Through Mechanical Test under Moisture Difference² (DMD2016-8506)
Inchul Yang, Department of Medical Biotechnology, Dongguk University, Research Institute, Solmedix Co., Ltd; Sungmin Kim, Department of Medical Device Industry, Dongguk University; Hocnh Kang, Department of Medical Biotechnology, Dongguk University, Research Institute, Solmedix Co., Ltd; Hyeyeong Lee and Jiyee Kwon, Department of Medical Device Industry, Dongguk University; Sungmin Kim, Department of Medical Biotechnology and Department of Medical Device Industry, Dongguk University

104. Application of Sociometers in the Emergency Department¹ (DMD2016-8508)
Renaldo Blcker, Denny Yu, Hunter Hawthorne and Mustafa Sir, Department of Health Sciences Research, Mayo Clinic; Thomas Hellnich, Department of Emergency Medicine, Mayo Clinic; Susan Halbeck, Department of Health Sciences Research, Mayo Clinic; David Nestler, Department of Emergency Medicine, Mayo Clinic; Kalyan Pasupathy, Department of Health Sciences Research, Mayo Clinic

105. Design of a Compact High Torque Actuation System for Portable Powered Ankle-Foot Orthosis² (DMD2016-8511)
Ziming Wang and Elizabeth Hsiao-Wecksler, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign

106. Failure Mode Analysis and Design Optimization of a Nitinol Framed Hernia Repair Device¹ (DMD2016-8513)
Richard Oliphant and Art Erdman, Department of Mechanical Engineering, University of Minnesota

107. Development and Analysis of a Sensor Enabled In-Ear Device for Physiological Monitoring² (DMD2016-8514)
Kira Erickson, Molly McMahon and Lucy Dunne, Department of Design, Housing, and Apparel, University of Minnesota; Christopher Larsen, Brian Olmstead and Jeremy Hipp, Honeywell International, Inc.

108. Development of Thin and Flexible Sensor System for Stress Evaluation of Contact Interface² (DMD2016-8515)
Kazuhiro Fujisaki, Satoshi Ogawa, Renta Kasai and Kazuhiko Sasagawa, Department of Mechanical Engineering, National Central University; Sungmin Kim, Department of Medical Device Industry, Dongguk University; Cesar Davis, Department of Mechanical Science and Engineering, National Central University

109. Effects of Varied Cortical shells and Tooth Situations to the Structure Resonance in Dental Implantation² (DMD2016-8520)
Trinh Minh Cong, Department of Biomedical Sciences and Engineering, National Central University; Chin-Sung Chen, Department of Dentistry, Sijih Cathy General Hospital; Min-Chun Pan, Department of Biomedical Sciences and Engineering, Department of Mechanical Engineering, National Central University

110. Improvement of Mobile Device Connectable Bioelectrical Impedance Analyzer² (DMD2016-8521)
ByungHo Choi and JungMin Kim, Donut System LSI Co., Ltd.; Yoon Ho Shin and GyeongCheol Choi, SK TELECOM Co., Ltd.; JungHun Choi, Department of Mechanical Engineering, Georgia Southern University
"YOU ARE HERE"
Look for the blue star on the digital signs.
2016 DMD Conference Executive Planning Committee:
Maya Boren, Assistant Coordinator
William Durfee, Technical Program Chair
Arthur Erdman, Conference Chair
Mike Finch, Committee Member
Jenny Holden, Conference Administrator
Trisha Huntosh, Conference Coordinator
Paul Iaizzo, Conference Co-Chair
Matthew Johnson, Contributed Papers Chair
Dan Kussman, Live Clinical Cases Chair
Michael McAlpine, Emerging Technology Forum Chair
Ken Rosen, Committee Member
Dale Wahlstrom, Committee Member
Gary Williams, AV Technical Specialist

Special Thanks to:
ASME Journal of Medical Devices
Bloom Sugar Bloom
Contributed Papers Reviewers
Conference Volunteers
Creative Resources
Curbside Productions
D’Amico Catering
Hubbell/Tyner
McNamara Alumni Center
PSAV Presentation Services
Session Organizers
TCF Bank Stadium
The Commons Hotel
The Corner Balloon Shoppe
UMNPosters.com
Wallace | Carlson Printing

<table>
<thead>
<tr>
<th>Save the Dates!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2017 Design of Medical Devices Conference</strong></td>
</tr>
<tr>
<td>April 10, 11-13</td>
</tr>
<tr>
<td>The Commons Hotel &amp; McNamara Alumni Center</td>
</tr>
<tr>
<td>Minneapolis, Minnesota</td>
</tr>
<tr>
<td><strong>2018 Design of Medical Devices Conference</strong></td>
</tr>
<tr>
<td>April 9, 10-12</td>
</tr>
<tr>
<td>The Commons Hotel &amp; McNamara Alumni Center</td>
</tr>
<tr>
<td>Minneapolis, Minnesota</td>
</tr>
<tr>
<td><strong>2019 Design of Medical Devices Conference</strong></td>
</tr>
<tr>
<td>April 15, 16-18</td>
</tr>
<tr>
<td>The Commons Hotel &amp; McNamara Alumni Center</td>
</tr>
<tr>
<td>Minneapolis, Minnesota</td>
</tr>
</tbody>
</table>