



# DESIGN DAY 2018



**OPUS**  
College of Engineering

MARQUETTE UNIVERSITY

## MESSAGE FROM THE DEAN

Dear Opus College of Engineering Community:

Welcome to our fourth annual Design Day, a celebration of the design and innovation that goes on throughout the Opus College of Engineering. I look forward to this event each year as we watch students put their knowledge and skills into action to solve real-world problems.

This opportunity not only helps our students to develop design thinking, but also an entrepreneurial mindset. The world no longer needs the obedient engineer of the past, but rather entrepreneurially minded engineers – men and women who are creative, innovative and ethical servant leaders that are comfortable with being uncomfortable. It's only once we engage both a design and entrepreneurial mindset that we can go on to solve the world's most pressing problems through engineering.

As you walk through Engineering Hall, you will see senior, freshman, student-led and course-related design projects on display. I encourage you to engage with our students and ask them questions about their work. I'm confident you'll share the same energy and enthusiasm our students have about their work on display here today.

This day would not be possible without the support of our many generous sponsors, as well as those organizations who have sponsored senior design projects over the years. Your involvement with our college has a direct impact on our students that provides them with valuable real-world experience.

Thank you for joining us in celebration of our students – the next generation of entrepreneurial engineers that will use their skills to serve the greater good.

Sincerely,

**Kristina Ropella, Ph.D.**

Dean – Opus College of Engineering  
Marquette University

## DESIGN DAY SCHEDULE and LOCATIONS | MAY 4, 2018

### College of Engineering Design Day, May 4, 2018 Schedule of Events

Oral Presentations		Posters/Demos	
8:30 - 9:00	Continental Breakfast - Levels 1 and 2		
9:00-9:30	MEEN Senior Design	Student-led Design Projects (Lower Level)	BIEN Poster Exhibit & Competition (Levels 1 and 2)
9:30-10:00	EECE Senior Design		
10:00-10:30	Keynote* Plexus	Course Design Projects (Level 3)	
10:30-11:00	Keynote* ARCO		
11:00-11:30	Keynote* BIEN Senior Design B	Course Design Projects (Levels 2 & 3)	
11:30-12:00	Keynote* EECE Senior Design		
12:00-12:30	Keynote* HUSCO		
12:30-1:00			
1:00-1:30			
1:30-2:00			
2:00-2:30			
2:30-3:00			
3:00-3:30			
3:30-4:00			
4:00-4:30			
4:30-5:00			
	Rm. 236	Rm. 336	Levels 1 & 2
	Rm. 136		Lower Level, Levels 2 & 3
	Rm. 128		
	Rm. 323		

\*Lunch will be available at noon for attendees of keynote presentations.

**Posters and Demonstrations**  
**ENGINEERING HALL LOWER LEVEL and LEVELS 1–3**

**9:00 AM –10:30 AM**  
**STUDENT-LED DESIGN PROJECTS**

**LOWER LEVEL**

- Baja Car (SAE Student Chapter)
- Steel Bridge (ASCE Student Chapter)
- Concrete Canoe (ASCE Student Chapter)
- Biomed-Bootcamp Program (BMES Student Chapter)
- High School Design Challenge (BMES Student Chapter)
- Embyr Technologies
- Hard Drive Clock
- ALIVE Project
- Society of Women Engineers (SWE) Student Chapter
- National Society of Black Engineers (NSBE) Student Chapter

**LOWER LEVEL (VISUALIZATION LAB):**

- Water Project (EWB Student Chapter)
- Bridge Project (EWB Student Chapter)
- Immersive Virtual Environment Demonstrations

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**10:00 AM–1:00 PM**  
**COURSE DESIGN PROJECTS**

**LEVEL 3:**

- Operating Systems (Room 336 – Oral presentations/demos)

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**1:00 PM–2:30 PM**  
**COURSE DESIGN PROJECTS**

**LEVELS 2 AND 3:**

- Industrial Design-Da Vinci 2
- Manufacturing Engineering
- Electrical Engineering Freshman Seminar
- Digital Control Systems
- Advanced VHDL and FPGA Design
- Introduction to Algorithms
- Mechanics of Materials
  
- Operating Systems (2-3 pm, Room 336 – Oral presentations/demos)

**Posters and Demonstrations**  
**ENGINEERING HALL LOWER LEVEL and LEVELS 1–3**

**10:00 AM–11:30 AM**  
**BIEN POSTER COMPETITION\***

**LEVELS 1 AND 2**

This session will include posters and mock-ups/prototypes from 35 design teams of new engineering students enrolled in BIEN 1110. The theme of the design projects (sponsored by Siemens Healthcare) is *Improving Cardiac Care*.

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**1:30 PM–3:00 PM**  
**CCEE VIDEO COMPETITION\***

**LEVEL 1**

This session will include video posters from 11 design teams of new engineering students enrolled in CEEN 1210. The theme of the design projects is *Renewable Energy for Residential Use in Southeast Wisconsin*.

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**3:30 PM–5:00 PM**  
**GEEN POSTER COMPETITION\***

**LEVELS 1 AND 2**

This session will include posters and mock-ups/prototypes from 19 design teams of new engineering students enrolled in GEEN 1210. The theme of the design projects is *Water and Energy Sustainability*.

\*Prizes for this year's BIEN, CCEE, and GEEN poster competitions were donated by Milwaukee Electric Tool Corporation.

## KEYNOTE PRESENTATIONS • Noon to 1 PM

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Location: EH 128

# ARCO

DESIGN/BUILD BTS

### **What's Unique About Design/Build Construction?**

**Jake Stefan** – President of ARCO Design/Build BTS

Come to find out the nuances between the Design/Build process and Plan & Spec. What are the differences? What role does the owner play in the process? What are the pros and cons of each process?

ARCO Design/Build is a national design/build general contractor specializing in the design and construction of commercial buildings that "Make America Go." With 25 years of experience designing, building, and delivering custom facility solutions that solves clients' problems, Mr. Stefan will introduce this content and facilitate a discussion with his audience.

Location: EH 136

# PLEXUS

The Product Realization Company

### **Riding Into the Future with Plexus and Trek: A Case Study on EMC Compliance**

**Ryan Thompson** – Senior Staff Design Engineer, Plexus

Plexus has been helping customers bring their products to market for over 35 years. This includes designing complex products with innovative technologies to meet the latest industry standards. Plexus recently teamed with Trek Bicycle to launch a new bicycle-sharing electronic smart kit and kiosk, featuring Internet of Things connectivity including cellular data, GPS, and Bluetooth. This presentation provides an overview of the smart kit and kiosk as a case study for electromagnetic compatibility (EMC), and it discusses how all engineering disciplines play a role in successfully designing a compliant product.

## KEYNOTE PRESENTATIONS • Noon to 1 PM

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Location: EH 236

# HUSCO

INTERNATIONAL  
central focused - technology driven

### **Robotics in Construction: What's the Holdup and How HUSCO International is Making it Possible!**

**Ben Holter** – Off-Highway System Engineering Manager, HUSCO International

Robots are becoming common place in the industrial space to aid in worker safety, productivity, and quality. However, when we look at the world's largest manufacturing site (the construction site), we do not see the same move to robotics. Robots in the industrial world rely on highly accurate servo motors for repetitive movements and communicate over many different digital protocols. Construction machines use power dense hydraulics for actuator movements and many still communicate via physical hydraulic signals. These key differences have caused many roadblocks in the move to robotics for construction equipment. HUSCO International is changing this.

HUSCO International is working with the world leaders in the robotic and construction sector to make hydraulic construction machines into robots. In this presentation you will learn about the advantages and roadblocks of turning 20+ ton machines into robots and how HUSCO International engineers are tackling this colossal change. Throughout this presentation we will also discuss what it takes for an engineer such as yourself to succeed in this exciting new engineering world.

Location: EH 323

# KEEN

ENGINEERING UNLEASHED

### **Designing the Best Bat**

**Douglas E. Melton, PhD** – The Kern Family Foundation

Hitting a major league fastball; striking a 3-inch sphere at 90 mph. It is a superhuman feat that is "clearly impossible," says Robert Adair, a Yale physicist who has studied the science of baseball. In this presentation, we have an opportunity to consider the design of bats and investigate the interaction between a bat and ball. The design of a bat requires an understanding of both the science and sport. As a bat designer, you'll get an opportunity to consider materials, vibrations, ergonomics, safety, the business surrounding the sport. This presentation will stimulate your curiosity, emphasize design connections, and focus on creating value — all part of an entrepreneurial mindset. By the end of this presentation, you'll see how an entrepreneurial mindset can be applied to all designs (even bats). Your participation will make this a home run!

**Biomedical Engineering**  
**Senior Design Project Oral Presentations**  
**ENGINEERING HALL ROOMS 236 | 128**

**SESSION A: ROOM 236**

**9:00–9:30 AM**

Faculty Advisor:  
Industry Sponsor:  
Team Members:

**PHANTOM TO SIMULATE FLOW OF CONTRAST AGENT**

T. Gilat-Schmidt  
C. Hammond, GE Healthcare  
K. Driscoll  
C. North  
L. Ernst  
T. Jessup  
A. Amore

**9:30–10:00 AM**

Faculty Advisor:  
Clinical Advisors:  
Team Members:

**DEVICE TO ASSIST WITH EDUCATIONAL ACTIVITIES\*\***

J. Goldberg  
S. Stibbs and K. Zvara  
D. Doherty  
M. Boehm  
C. Anderson  
S. Winther  
T. Fitzpatrick  
A. Sherman  
T. Schaut (Milwaukee Institute of Art and Design)

**10:00–10:30 AM**

Faculty Advisor:  
Team Members:

**LEG EXTENSION DEVICE\*\***

J. Goldberg  
B. Rappaport  
M. Oleson  
M. Stillings  
A. Walker  
B. Scaglione  
S. Bruening (Milwaukee Institute of Art and Design)  
T. Krueger (Milwaukee Institute of Art and Design)

**10:30–11:00 AM**

Faculty Advisor:  
Clinical Advisor:  
Team Members:

**IMPROVEMENTS TO LAPAROSCOPIC INSTRUMENTS\***

B. Yu  
R. Higgins  
M. Coughlin  
J. Frigo  
R. O'Toole  
M. Rawson  
B. Kwak  
D. Wozniak

**11:00–11:30 AM**

Faculty Advisor:  
Industry Sponsor:  
Team Members:

**SCANNING OF MAXILLARY/MANDIBULAR ARCH**

T. Gilat-Schmidt  
A. Kastanek, 3M  
M. Messina  
L. Vlach  
J. Prom  
J. Riebe  
M. Tenuto

**1:30–2:00 PM**

Faculty Advisor:  
Team Members:

**CUSTOM BASKETBALL WHEELCHAIR\*\***

B. Silver-Thorn  
R. Sheard  
N. Burke  
S. Crawford  
R. Patel  
F. Ellis

**2:00–2:30 PM**

Faculty Advisor:  
Team Members:

**MEDICAL DRONE\***

J. Goldberg  
M. Cahill  
C. Fennig  
D. Lejman  
L. O'Donnell  
R. Streit  
J. Zanfardino

\*Supported by R25 EB013070 from the National Institute of Biomedical Imaging and Bioengineering.

\*\*Supported by Marquette University Strategic Innovation Fund Grant.

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\*\*Supported by Marquette University Strategic Innovation Fund Grant.

**2:30–3:00 PM**

Faculty Advisor:

Team Members:

**DEVICE TO ASSIST WITH FEEDING ACTIVITIES\*\***

B. McHenry

M. Brody

A. Sillin

A. Galarneau

M. McDonald

M. Erickson

C. Hanson

T. Powers (Milwaukee Institute of Art and Design)

P. Carranza (Milwaukee Institute of Art and Design)

**3:00–3:30 PM**

Faculty Advisor:

Sponsor:

Team Members:

**HAMSTRING PERFORMANCE MONITORING DEVICE\***

B. Stemper

D. Kant-Hull, Marquette University Weight Room

A. Hunter

D. Morgan

M. Rather

M. Kwapick

B. Golliday

J. Akim (Milwaukee Institute of Art and Design)

A. Upadhyaya (Milwaukee Institute of Art and Design)

**3:30–4:00 PM**

Faculty Advisor:

Team Members:

**ALIVE**

J. LaDisa

A. Barrington

T. Pawlicki

C. Pawlicki

M. Barrowclift

**4:00–4:30 PM**

Faculty Advisor:

Industry Sponsor

Team Members:

**ECG SIMULATOR**

G. Garcia

J. Westcott, Mortara Instruments

C. Shale

K. Mysliwicz

T. Brackeen

D. Dembo

**4:30–5:00 PM**

Faculty Advisor:

Team Members:

**LOW COST VENTILATOR\***

L. Olson

R. Vega

J. Hjelmgren

J. Aculado

J. Bralick

J. Wallenfeng

P. Connelly

**SESSION B: ENGINEERING HALL 128****1:30–2:00 PM**

Faculty Advisor:

Sponsor:

Team Members:

**HYPOTHERMIA BLANKET**

S. Audi

K. Weidman, M.D.

B. Smith

A. Valente

A. Tufano

B. Irving

B. Spingola

**2:00–2:30 PM**

Faculty Advisor:

Team:

**FINGER INDIVIDUATION DEVICE**

B. Schmit

N. Gregg

L. Reim

A. Reim

M. O'Connor

B. Moffett

S. Joseph (Milwaukee Institute of Art and Design)

C. Quinn (Milwaukee Institute of Art and Design)

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\*\*Supported by Marquette University Strategic Innovation Fund Grant.

**2:30–3:00 PM**

Faculty Advisor:

Team Members:

**IN-HOME THERAPY DEVICE\*\***

S. Beardsley

M. Gotthelf

B. Mol

L. Connelly

C. Manchester

K. Ramos-Delgado

J. Harding (Milwaukee Institute of Art and Design)

**3:00–3:30 PM**

Faculty Advisor:

Clinical Advisor:

Team Members:

**IMPROVED DESIGN OF G-TUBE\***

J. Goldberg

C. Schindler

W. Clawson

S. Green

K. Moyle

**Civil, Construction and Environmental Engineering  
Senior Design Project Oral Presentations  
ENGINEERING HALL ROOM 323**

**9:00–9:30 AM**

Mentors:

Team Members:

**WASTE WATER TREATMENT PLANT**

C. Bolle and K. Berg, Strand Associates, Inc.®

R. Atari

A. Gottlieb

E. Kennedy

J. Rosenthal

**9:30–10:00 AM**

Mentor:

Team Members:

**WILD COMMONS CONSTRUCTION**

M. Stern, J.H. Findorff and Son

E. Baas

C. Grove

J. Kissel

A. Wycklendt

**10:00–10:30 AM**

Mentors:

Team Members:

**DREXEL AVENUE RECONSTRUCTION**

J. Diekfuss, T. Barbeau, J. Bruggeman,

J. Schueler, RA Smith National

A. Alberico

K. Gorham

S. Nikho

**10:30–11:00 AM**

Mentor:

Team Members:

**AHPRC CONSTRUCTION – TEAM 1**

C. Labucki, Mortenson

L. Crofton

W. Fay

M. Gesiork

A. Sundance

**1:30–2:00 PM**

Mentor:

Team Members:

**AHPRC CONSTRUCTION – TEAM 2**

C. Labucki, Mortenson

M. Del Arca

S. Magnuson

J. Tschida

A. Walker

\*Supported by R25 EB013070 from the National Institute of Biomedical Imaging and Bioengineering.

\*\*Supported by Marquette University Strategic Innovation Fund Grant.

**Computer and Electrical Engineering and Computer Science  
Senior Design Project Oral Presentations  
ENGINEERING HALL ROOM 136**

**9:30–10:00 AM**

**ENHANCING PARALLEL PROCESSING USING GPU CLUSTERS**

Faculty Advisor: S. Puri  
Sponsor: M. Bachman  
Team Members: C. Matta  
M. Kinzler  
L. Jonas  
T. Buente

**10:00–10:30 AM**

**BIOMETRIC AUTHENTICATION FOR DIGITAL PERSONAL ASSISTANTS**

Faculty Advisor/Sponsor: D. Perouli  
Team Members: V. Marin  
J. Marotta

**10:30–11:00 AM**

**INTERNET OF THINGS – CONNECTED CLINICAL DEVICES**

Faculty Advisor: R. Povinelli  
Sponsor: K. Newbury, Direct Supply  
Team Members: Z. Shen  
F. Reda  
R. Clulo  
S. Norris

**11:00–11:30 AM**

**ELDER CARE ROBOT: HELPER AND COMPANION**

Faculty Advisor/Sponsor: S.I. Ahamed  
Team Members: G. Brown  
Z. Burk  
C. Martin  
M. Panetta  
A. Shanaa

**1:30–2:00 PM**

**HEALTH MONITORING SYSTEM FOR GASDAY**

Faculty Advisor: G. Corliss  
Sponsor: GASDAY Lab  
Team Members: J. Reilly  
J. Drenovsky  
J. Quintas  
J. Furst

**2:00–2:30 PM**

Faculty Advisors:  
Sponsor:  
Team Members:

**ROOM SENSOR NETWORK**

T. Schwarz and C. Tamma  
E. Plate, Kohler Company  
V. Zornow  
K. Banky  
K. Schwab  
A. Kobiela  
B. Stumph  
S. Patel

**2:30–3:00 PM**

Faculty Advisors:  
Sponsor:  
Team Members:

**WATER USAGE DATA SYNTHESIS**

D. Perouli and T. Schwarz  
E. Plate, Kohler Company  
T. Hicks  
J. Markvart  
A. Dawson  
M. Mogenson  
R. Mercado

**3:00– 3:30 PM**

Faculty Advisor:  
Sponsor:  
Team Members:

**SMELLY SOCKS PROJECT— FIGHTING MALARIA ONE SMELLY SOCK AT A TIME**

G. Corliss  
Ifakara Health Institute  
C. Blazer  
D. McKay  
J. Miller  
C. Quinn,  
B. Van Rossum  
D. Whitney

**3:30–4:00 PM**

Faculty Advisor:  
Sponsor:  
Team Members:

**UNIVERSAL POWER INPUT DEVICE**

N. Weise  
Briggs and Stratton  
M. Deroeck  
K. Haberkorn  
L. Haberkorn  
J. Josse  
J. Lizalek  
D. Wang

**4:00–4:30 PM**

Faculty Advisor/Sponsor:  
Team Members:

**SOLARDASH: ANDROID DASHBOARD FOR A SOLAR CAR**

C. Ababei  
K. Baert  
A. Luczak  
J. Cook



**Mechanical Engineering Senior Design Project  
Oral Presentations  
ENGINEERING HALL ROOM 128**

**MARQUETTE UNIVERSITY DORMITORY PROJECT**

**9:00–9:30 AM**

**REDESIGN OF A STETHOSCOPE FOR USE  
IN DEVELOPING COUNTRIES**

Faculty Advisor:  
Sponsor:  
Team Members:

V. Cariapa  
Marquette University  
B. Kennedy  
S. Khouri  
A. Martinez  
J. Pasternak  
N. Swanberg  
B. Van Blarcom

**9:30–10:00 AM**

**DEVELOPING (DESIGNING & TESTING) SCROLL-TYPE  
AIR COMPRESSOR AND/OR EXPANDER  
(MINI GENERATOR)**

Faculty Advisor:  
Sponsor:  
Team Members:

H. Park  
Marquette University  
T. Burke  
M. Hughes  
D. Stemper  
A. Tripi  
G. Younger

**10:00–10:30 AM**

**AUTONOMOUS SNOWPLOW**

Faculty Advisor:  
Sponsor:  
Team Members:

A. Bowman  
Marquette University and Douglas Dynamics  
A. Cotteleer  
C. Dewey  
J. Engel  
M. Froemming  
G. Hooley  
T. Milligan  
J. Ruplinger

***DEMONSTRATION OUTDOORS NEAR THE DLC  
11 AM TO NOON.***

**10:30–11:00 AM**

Faculty Advisor:  
Sponsor:  
Team Members:

**SAE BAJA ON-BOARD DATA LOGGING SYSTEM**

C. Allen  
Marquette University  
T. Arlotta  
Z. Bernaden  
J. Dolan  
B. Kendall  
J. Krakauer  
B. Kupczyk  
A. Zucca  
G. Zucca

***DEMONSTRATION OUTDOORS NEAR THE DLC  
11 AM TO NOON.***

## SPECIAL THANKS

### TO OUR STUDENTS:

Thank you to our dedicated, talented and hard-working engineering students for making Design Day 2018 possible. We are pleased to see you engaged in your work, collaborating with your fellow students, and using your skills and talents to **be the difference** in our Marquette community and beyond.

### TO OUR FACULTY:

Thank you for the time, effort, and care you put into advising our students on their design projects throughout their time here at the Opus College of Engineering. Your guidance, support, and advice are appreciated as you help our students develop into engineers who solve important problems, create value for others, and lead their profession.

### TO OUR INDUSTRY PARTNERS:

Thank you for your time and support of our mission in the Opus College of Engineering. Your participation in the education of our students helps them to gain valuable real-world experience and prepares them for successful engineering careers.



**OPUS**

College of Engineering

MARQUETTE UNIVERSITY

## COLLABORATE WITH OUR STUDENTS

### SENIOR DESIGN

At the Opus College of Engineering, all senior engineering students are required to successfully complete a senior design project. Teams working on industry-sponsored projects are advised by an Opus College faculty member and a representative from the sponsoring company. Sponsoring companies are required to identify a company representative to act as an advisor to the project team, provide funding for prototypes and testing (cost dependent on needs and expectations of sponsor) and provide feedback to students on project requirements, customer needs and potential designs.

#### WHY SPONSOR A SENIOR DESIGN PROJECT?

- Access to additional engineering resources at little cost to company
- Involvement and participation in training of new engineers and potential employees
- On-campus advertisement of sponsoring company

If you are interested in sponsoring a senior design project, please contact Laura Lindemann, director of industry relations, at (414) 288-5698 or [laura.lindemann@marquette.edu](mailto:laura.lindemann@marquette.edu).

### UNDERGRADUATE RESEARCH FELLOWSHIP PROGRAM

Discovery and innovation are the cornerstones of an engineering education at the Opus College of Engineering. The Undergraduate Research Fellowship Program is designed to bring these cornerstones to life by supporting a cohort of student and faculty researchers from March through December, where they work side-by-side to transform learnings from the classroom into practical research applications. For a \$5,000 sponsorship, industry partners have the opportunity to make a direct impact that allows our students to gain valuable hands-on experience in engineering research.

#### WHY SPONSOR AN UNDERGRADUATE RESEARCH FELLOWSHIP?

- Access to highly motivated, diverse students for potential recruitment
- Exposure at annual Opus College of Engineering Undergraduate Research Day
- Opportunity to name your fellowships after your organization
- Potential to shape research questions to address key areas of need

If you are interested in sponsoring an Undergraduate Research Fellowship, please contact the Office of Research and Grant Development at (414) 288-1920 or [coe-research@marquette.edu](mailto:coe-research@marquette.edu).

**WE LOOK FORWARD TO WORKING WITH YOU.**

**DESIGN DAY 2018**

# SPECIAL THANKS TO OUR GENEROUS SPONSORS

## PREMIUM SPONSORS



## KEYNOTE SPONSORS



## EVENT SPONSORS

