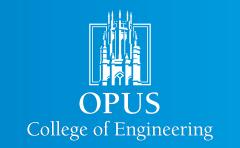


# DESIGN DAY ENGINEERING HALL | MAY 3, 2019



MARQUETTE UNIVERSITY

Dear Opus College of Engineering Community:

Welcome to our fifth 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 and the excitement it brings to our building.

Design Day is not only about recognizing the hard work our students have put into their projects over the past year, but it is just as much about celebrating how they have grown as innovators. I believe that with the right mindset and the curiosity to learn, we can all lead innovative projects that will create real, new value and solve some of the world's most pressing problems. Each year I am proud to see that at the heart of all our student design projects, is a desire to deliver meaningful change. This year's projects deliver on that, too.

As you walk through Engineering Hall, you will see senior, freshman, studentled and course-related design projects on display. I hope you will take a moment to talk with our students and hear more about their work. I'm confident that you, too, will be inspired by what you learn.

On behalf of our students, I would like to thank our many generous event and senior design project sponsors, as well as our college faculty and staff. Without you, this day would not be possible.

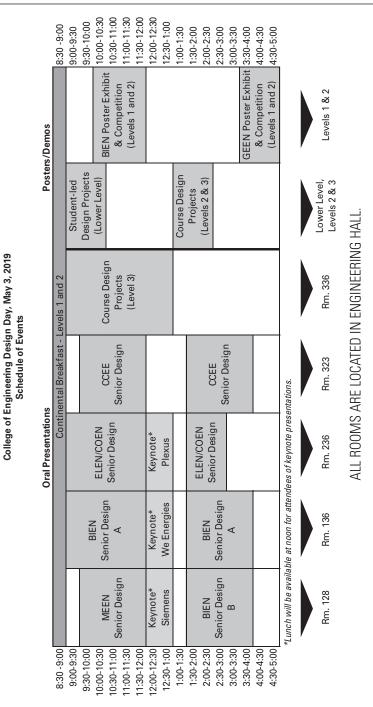
Thank you for joining us to celebrate another great year of hard work, innovation, and the students who are already setting our world on fire.

Sincerely,

#### Kristina Ropella, Ph.D.

Opus Dean – Opus College of Engineering Marquette University





**DESIGN DAY 2019** 

#### Posters and Demonstrations LOWER LEVEL and LEVELS 1–3

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

LOWER LEVEL

- Baja Car (SAE Student Chapter)
- Concrete Canoe (ASCE Student Chapter)
- Wireless Phone Charger
- Lift Assist for an Aerial Bucket
- Human-Powered Water Sculpture
- AI-Ready Research Portal (SIIM Hackathon)
- Safety Jacket
- Smart Shower
- Biomedical Engineering Society (BMES) Student Chapter
- Society of Women Engineers (SWE) Student Chapter

#### LOWER LEVEL (VISUALIZATION LAB):

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

#### 9:00 AM-1:00 PM COURSE DESIGN PROJECTS

LEVEL 3

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

#### 1:00-2:30 PM COURSE DESIGN PROJECTS

#### LEVELS 2 AND 3

• Dynamics

4

- Manufacturing Engineering
- Digital Control Systems
- Digital Signal Processing
- Advanced VHDL and FPGA Design
- Introduction to Algorithms
- Mechanics of Materials
- Design of Machine Elements

#### Posters and Demonstrations LOWER LEVEL and LEVELS 1–3

#### 10:00 AM-12:00 PM BIEN POSTER COMPETITION\*

#### LEVELS 1 AND 2

This session includes posters and mock-ups/prototypes from 26 design teams of new engineering students enrolled in BIEN 1110. The Biomedical Engineering freshman class will be presenting their ideas that address needs within the senior health community impacting senior care and/or quality of life. *Sponsored by Direct Supply* 

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

#### LEVELS 1 AND 2

This session will include posters and mock-ups/prototypes from 20 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 and GEEN poster competitions were donated by Milwaukee Tool.

Ingenuity for life

**Realizing Next – The Value of the Digital Twin Scott Felber** – Market Management Manager NX Designs, Siemens Product Lifecycle

#### Location: Room 128

Digitalization or the digital twin, are words we are talking about every day in engineering. The digital twin is a precise virtual model of a product or production or performance assets as they evolve through their lifecycle. In this presentation we will see how the digital twin influences the entire engineering process when we make even a small design change. We will step through examples showing how companies save time executing design changes by keeping everyone notified of the status and how by using an integrated approach eliminates the need to re-enter data.



Not your Grandfather's (or your Father's) Electric Company Paul Gogan – Manager Electric Reliability, We Energies Dave Nestler – Planning and Engineering Manager, We Energies

#### Location: Room 136

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The electric industry is changing. The new electric company incorporates new technologies such as electric vehicles, renewable generation, energy storage, micro grids, data analytics, robots, drones, python geospatial programming, smart sensors, Smart Phone apps, and augmented reality. We will discuss how each of these technologies plays a vital part in shaping the New Electric Utility.

We Energies provides electrical service to areas of Wisconsin and Michigan's Upper Peninsula, and natural gas and steam energy to areas of Wisconsin.



The Product Realization Company

Tolerance Mistaken: Impacts of Not Properly Addressing Design for Manufacturability Dale Lee – Senior Staff DFX Strategy Engineer, Plexus

#### Location: Room 236

Electronic assemblies today are smaller and lighter with increased functionality per unit area and/or volume. The rate of new technology adoption is increasing; however, design methods, industry standards, materials and manufacturing processes utilized during the product development and production process have not progressed to meet these new demands. Thus many of the tolerance margins that were considered insignificant and acceptable in the past are now critical to high yield, reliable products. This presentation will highlight issues with today's electronic designs and impacts when material limitations, industry standards and assembly tolerances are not adequately addressed during design, printed circuit board (PCB) fabrication, assembly and test.

#### **Biomedical Engineering Senior Design Project Oral Presentations** ROOMS 136 | 128

#### SESSION A: ROOM 136

#### DEVICE TO PROVIDE CONTINUOUS REAL-TIME FEEDBACK **OF HEART RATE PEAK FREQUENCY AND POWER**

Sponsor: Faculty Advisor: Team Members:

9:00-9:30 AM

T. Chelimsky, Medical College of Wisconsin S. Audi L. Jimenez A. Heigl E. De Leon J. Hubler D. Newman

9:30-10:00 AM

Sponsor: Faculty Advisor: Team Members:

## 10:00-10:30 AM

**Clinical Advisor:** Faculty Advisor: Team Members:

#### **CT AND MR PHANTOM FOR STUDY OF LIVER TISSUE**

S. Slavic, GE Healthcare T. Gilat-Schmidt D. Ostrander K. Ramos K. Cardoza C. McColl D. Butler

#### **PORTABLE POSITIONING DEVICE FOR STANDARD CHAIRS\***

A. Pleva S. Beardsley T. Echols L. Moolavil W. Wilson S. Doddi I. Garcia-Casas Tron (Milwaukee Institute of Art and Design) A. Felix (Milwaukee Institute of Art and Design)

#### 10:30-11:00 AM

1:30-2:00 PM

Sponsor:

Clinical Advisor: Faculty Advisor: Team Members:

#### **COMMUNICATION ASSIST DEVICE\***

- M. Houser S. Beardsley H. Barakat A. Kehn O. Dau 0. Ballatin J. Wiszniewski V. Heyer (Milwaukee Institute of Art and Design) E. Berndt (Milwaukee Institute of Art and Design) 11:00-11:30 AM **PEDIATRIC WALKER FOR G-TUBE EQUIPMENT\*** Clinical Advisor: C. Schindler, Marguette University College of Nursing Faculty Advisor: J. Goldberg Team Members: L. Hawkins C. Curtin J. Amedio A. Ezzell E. Granados Centeno S. Hernandez (Milwaukee Institute of Art and Design) G. Dyke (Milwaukee Institute of Art and Design) A. Lundberg (Milwaukee Institute of Art and Design) 11:30 AM-12:00 PM **RESCUE MANNEQUIN NECK TO SIMULATE SPINAL** CORD INJURIES FOR FIRST RESPONDER TRAINING Sponsor / Faculty Advisor: F. Pintar, Medical College of Wisconsin Team Members: Z. Wilcox A. Beduhn K. Dolick M. Rose C. Gunderman LARYNGEAL NERVE MONITORING IN INFANTS TO PREVENT VOCAL CORD PARALYSIS DURING SURGERY T. Robey, Medical College of Wisconsin Faculty Advisor: G. Garcia Team Members: N. Lundeen
  - K. Nordmeyer
  - L. Miller
  - L. Chambers
  - L. Arant

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

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

#### SESSION A: ROOM 136

<b>2:00–2:30 PM</b> Clinical Advisor: Faculty Advisor: Team Members:	DEVICE TO ASSIST WITH TRANSFER FROM WHEELCHAIR TO CAR/VAN** A. Morgan, C. Schindler, Children's Hospital of Wisconsin J. Goldberg K. Dausman B. Sylvester A. Mangelsdorf K. Hornberger R. Serfas B. Sanna (Milwaukee Institute of Art and Design)	<b>3:30–4:00 PM</b> Sponsor: Faculty Advisor: Team Members:	WHEELCHAIR TRANSFER ASSIST DEVICE** L. Kahle J. Goldberg C. Fitzgerald J. Schneider T. McNutt K. Beyers	
	D. Gabriel (Milwaukee Institute of Art and Design)	SESSION B: ROOM 128		
2:30–3:00 PM	TENSIOMYOGRAPHY DEVICE FOR ATHLETIC TRAINING AND REHABILITATION*	1:30-2:00 PM	ANKLE FOOT ORTHOSIS WITH IMPROVED INVERSION CONTROL*	
Sponsor/Advisor:	D. Kant-Hull, Marquette University Athletics	Sponsor:	B. Robertson-Dick, Medical College of Wisconsin	
Faculty Advisor:	B. Stemper	Faculty Advisor:	T. Onushko	
Team Members:	A. Amer	Team Members:	M. Lindway	
	M. Assad		B. Pacilio	
	E. Blais		M. O'Connell	
	M. Bellinder		D. Rivera	
	D.J. Seline		M. Solis (Milwaukee Institute of Art and Design)	
			E. Grinwald (Milwaukee Institute of Art and Design)	
3:003:30 PM	GO BABY GO! JOYSTICK CONTROLLED CARS FOR YOUNG			
	CHILDREN WITH DISABILITIES*	2:00-2:30 PM	NON-INVASIVE TESTING FOR IRON DEFICIENCY	
Sponsor:	B. McHenry	Sponsor:	M. Sikulu-Lord, Spectroscopy and	
Faculty Advisor:	J. Rammer		Data Consultants Pty Ltd.	
Team Members:	P. Lopez	Faculty Advisor:	B. Yu	
	K. Perez	Team Members:	A. Sanchez	
	B. Wrucke		J. Solito	
	M. Saleh		R. Florido	
	S. Hussain		W. Eng T. Rittenhouse	

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

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

#### **SESSION B: ROOM 128**

#### 2:30-3:00 PM

Sponsor: Faculty Advisor: Team Members:

#### HAND STRETCHING DEVICE

B. Robertson-Dick, Medical College of Wisconsin B. Schmit I. Burns R. Henry A. Williams

A. Cedillo

#### 3:00–3:30 PM

Faculty Advisor:

Team Members:

Sponsor:

Sponsor:

12

Faculty Advisor:

Team Members:

HUMAN MOTION ANALYSIS MODEL VALIDATION TOOL

A. Graf, Shriner's Hospital, Chicago, IL J. Fritz J. Benandi A. Lopez R. Jaber K. Wachholz J. Weaver

## 3:30–4:00 PM ASSISTIVE WALKING DEVICE TO CONTROL FOCAL SPASTICITY OF THE FOOT

S. Paterson, Resolution Medical, LLC J. Fritz J. Evanoff E. Bobeck D. Neubauer J. Baltz

E. Russell

#### Civil, Construction and Environmental Engineering Senior Design Project Oral Presentations ROOM 323

### 9:30–10:00 AM

Sponsors: Faculty Advisors: Team Members:

#### 10:00-10:30 AM

Sponsors: Faculty Advisors: Team Members:

#### 10:30-11:00 AM

Sponsors: Faculty Advisors: Team Members:

#### 11:00–11:30 AM

Sponsors: Faculty Advisors: Team Members:

#### 11:30 AM-12:00 PM

Sponsor:

#### **CENTER FOR DANCE** C. O'Donnell, HGA, Inc. M. Federle, D. Zitomer

Faculty Advisors: Team Members:

A. Gesior

R. Cullen

#### MIXED-USE, WATER-CENTRIC DEVELOPMENT AT MILWAUKEE'S REED STREET YARDS

C. Carr, P. Finn, P. Imig, K. Kasubowski, The Sigma Group M. Federle, D. Zitomer K. Brecht J. Fink T. Hombsch O. Wycklendt

#### MIXED-USE APARTMENT / COMMERCIAL BUILDING DEVELOPMENT

M. Stern, K. Loest, J.H. Findorff & Sons, Inc. M. Federle, D. Zitomer M. Yankee C. McGovern Z. Lukasik D. Hammond

#### WASTEWATER BIOLOGICAL TREATMENT AND INTERCEPTOR DESIGN

M. Castillo, K. Hermann, MSA Professional Services, Inc. M. Federle, D. Zitomer K. Harrison K. O'Malley M. Sizemore K. Paul

#### DREXEL AVENUE RECONSTRUCTION

T. Barbeau, J. Bruggeman, J. Schueler, R.A. Smith M. Federle, D. Zitomer A. Ball N. Perez P. Gallagher R. Sanchez

#### MILWAUKEE BALLET BAUMGARTNER CENTER FOR DANCE

E. Lehman C. Redman

1:30–2:00 PM	MIXED-USE, WATER-CENTRIC DEVELOPMENT				
	AT MILWAUKEE'S REED STREET YARDS		Electrical and Computer Engineering		
Sponsors:	C. Carr, P. Finn, P. Imig and K. Kasubowski, The Sigma Group	Seni	or Design Project Oral Presentations ROOM 236		
Faculty Advisors: Team Members:	M. Federle, D. Zitomer B. Groundwater C. Skelton M. Chrabaszcz N. Goldman	<b>9:00–9:30 AM</b> Sponsor: Faculty Advisor: Team Members:	AUTOMOTIVE DATA LOGGER Milwaukee Tool S. Schneider M. Hertel S. Stewart		
<b>2:00–2:30 PM</b> Sponsors: Faculty Advisors: Team Members:	<b>DREXEL AVENUE RECONSTRUCTION</b> T. Barbeau, J. Bruggeman and J. Schueler, R.A. Smith M. Federle, D. Zitomer J. Stasser		C. Conard J. Rozewicz E. Ciliske		
	L. Cimaglia C. Brauer M. Tobin	<b>9:30–10:00 AM</b> Sponsor: Faculty Advisor:	SYSTEM FOR STRESS TESTING OF SECURE DIGITAL (SD) CARDS Rockwell Automation R. Povinelli		
2:30–3:00 PM	MIXED-USE APARTMENT / COMMERCIAL BUILDING DEVELOPMENT	Team Members:	T. Bobeck Q. Gerhartz		
Sponsors: Faculty Advisors: Team Members:	M. Stern and K. Loest, J.H. Findorff & Sons, Inc. M. Federle, D. Zitomer D. White		C. Hels D. Zurawski		
	M. Goese D. Jahi	10:00–10:30 AM	VIBRATION BRACELET FOR HEARING-IMPAIRED ELDERLY PEOPLE		
	M. McKevitt	Sponsor: Faculty Advisor:	C. Ababei C. Ababei		
3:00–3:30 PM	MILWAUKEE BALLET BAUMGARTNER CENTER FOR DANCE	Team Members:	A. Foyer P. Hara		
Sponsor: Faculty Advisors: Team Members:	C. O'Donnell, HGA, Inc. M. Federle, D. Zitomer E. Diamond K. Mofatt B. Neuman		K. Conley J. D'Souza T. Janik J. Reichard		
	M. Zinnecker	10:30–11:00 AM	SUPPLY CHAIN MANAGEMENT FOR AI-POWERED TOOLS IN MEDICAL IMAGING		
<b>3:30–4:00 PM</b> Sponsors: Faculty Advisors: Team Members:	<b>INDUSTRIAL WAREHOUSE DESIGN</b> J. Stefan, B. Panis, T. Hefferon, ARCO Design/Build M. Federle, D. Zitomer M. Kelly L. Veon T. Daguison A. Byrne	Sponsor: Faculty Advisor: Team Members:	T.M. Sippel Schmidt T.M. Sippel Schmidt K. Chang A. Dums P. Moras		

11:00–11:30 AM Sponsor:	ELECTRONIC DISPLAY FOR ECE OFFICE C. Ababei	Mechai	nical Engineering Senior Design Project		
Faculty Advisor:	C. Ababei		Oral Presentations		
Team Members:	C. Gilger		ROOM 128		
ream wembers.	K. Etta				
	D. Maatman	9:30–10:00 AM	NASA ROBOTIC MINING COMPETITION		
	T. Ren	Sponsor:	NASA		
	L. Wedel	Faculty Advisor:	P. Voglewede		
	L. Wedel	Team Members:	M. Braccio		
11:30 AM–12:00 PM	ELECTRIC UTILITY AUGMENT REALITY	ream members.	T. Campbell		
11.30 AIVI-12.00 FIVI	INVESTIGATION		N. Faust		
Sponsor:	We Energies		K. Koumoutsos		
Faculty Advisors:	C. Tamma and R. Marklin		E. LeBeau		
Team Members:	A. Vonderhaar		Z. Nordgren		
	C. Baltrusch		Z. Pederson		
	D. Koetting		Z. Federson		
	J. Lee	10:00–10:30 AM	MOTORIZED PAINTBALL TRAINING SYSTEM		
	G. Thalji				
	G. maiji	Sponsor:	Marquette University		
1:30–2:00 PM	EXPLORE THE EXCHANGE, MANAGEMENT,	Faculty Advisor:	V. Cariapa V. Difatta		
1.30-2.00 FIVI	DISTRIBUTION AND USE OF "COMMON DATA	Team Members:			
	ELEMENTS" USING IHE STRUCTURED DATA		B. Eagan		
	CAPTURE FOR ONCOLOGY CLINICAL TRIALS		A. Gasperlin		
Sponsor:	T.M. Sippel Schmidt		P. Vasquez		
Faculty Advisor:	T.M. Sippel Schmidt		G. Von Der Lippe		
Team Members:	B. Miller				
Tealli Mellibers.	N. Olson	10:30–11:00 AM	FASN INDUSTRIAL AUTOMATION DEMONSTRATION		
	J. Funk	Sponsor:	Marquette University		
	J. FUIIK	Faculty Advisor:	J. Schimmels		
2:00–2:30 PM	<b>OPTIMIZATION OF VISION-BASED TRACKING</b>	Team Members:	J. Fuchs		
2.00–2.30 F IVI	ALGORITHMS		J. McKenna		
Chapaor	H. Medeiros		J. Obert		
Sponsor: Faculty Advisor:	H. Medeiros		P. Parisi		
-	I. Bremseth		R. Witt		
Team Members:	A. Shakal				
	M. Shreiner	11:00–11:30 AM	ROBOTIC FORGING CELL AND SENSOR		
			INSTRUMENTATION		
	N. Simon	Sponsor:	J. Domblesky		
2:30–3:00 PM	INTELLIGENT EMBEDDED SYSTEM	Faculty Advisor:	J. Domblesky and A. Bowman		
2:30–3:00 PW Sponsor:	M. Marischen	Team Members:	C. Byrne		
•	C. Tamma		J. Gladysz		
Faculty Advisor: Team Members:			L. Kirsch		
	N. Mussoline M. Marischen		H. Neumann		
			J. Steele		
	T. Parackal				
	M. Fiorini				
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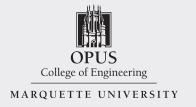
11:30 AM-12:00 PM Sponsor: Faculty Advisor: Team Members:

#### **SAE BAJA EAGLE 3 GEARBOX**

Eagle Racing, Marguette University J. Moore M. Ahmad C. Malliet B. Ollhoff M. Jensen J. Fuller

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**DESIGN DAY 2019**