



OPUS COLLEGE OF ENGINEERING  
**DESIGN DAY**

MAY 10, 2022



**OPUS**

College of Engineering

MARQUETTE UNIVERSITY

## MESSAGE FROM THE DEAN

Dear Opus College of Engineering Community:



Welcome to our seventh 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, 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 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 • May 10, 2022 • Schedule of Events

### Marquette University Opus College of Engineering Design Day • May 10, 2022 • Schedule of Events

		ORAL PRESENTATIONS				POSTERS/DEMOS			
9:00-9:30		MEEN Senior Design	BIEN Senior Design A	ELEN/COEN Senior Design	CCEE Senior Design				9:00-9:30
9:30-10:00									9:30-10:00
10:00-10:30									10:00-10:30
10:30-11:00									10:30-11:00
11:00-11:30									11:00-11:30
11:30-12:00									11:30-12:00
12:00-12:30	Keynote* Go Baby Go		Keynote* Kohler	Keynote* KEEN					12:00-12:30
12:30-1:00									12:30-1:00
1:00-1:30									1:00-1:30
1:30-2:00									1:30-2:00
2:00-2:30									2:00-2:30
2:30-3:00									2:30-3:00
3:00-3:30									3:00-3:30
3:30-4:00									3:30-4:00
4:00-4:30									4:00-4:30
4:30-5:00									4:30-5:00
*12-1pm: Lunch will be available for keynote attendees									
		<b>Rm. 128</b>	<b>Rm. 136</b>	<b>Rm. 236</b>	<b>Rm. 323</b>	<b>Levels 1 &amp; 2</b>			

- **DESIGN PROJECTS**
- **POSTER EXHIBITIONS AND COMPETITION**

**1:00–2:00 PM**

**COURSE DESIGN PROJECTS**

**LEVELS 1 AND 2**

Design of Machine Elements

**10:30 AM–12:00 PM**

**BIEN POSTER EXHIBITION**

**LEVELS 1 AND 2**

This session will include posters from 13 design teams of new engineering students enrolled in BIEN 1110. This year's design project tasked students with creating a web application and take-home document that helps a patient better understand the management and timeline for their cardiac disease state. Sponsored by Mpirik.

**3:30 PM–5:00 PM**

**GEEN POSTER EXHIBITION AND COMPETITION**

**LEVELS 1 AND 2**

This session will include posters and mock-ups/prototypes from 12 design teams of new engineering students enrolled in GEEN 1210. The theme of the design projects is Water and Energy Sustainability.

**KEYNOTE PRESENTATIONS 12:00 to 1:00 PM**

***GO BABY GO! MILWAUKEE***

**Room 128**

**Molly Erickson, BS. and Gerald Harris, PhD, PE**

The nationwide, open-source Go Baby Go! program is dedicated to helping children with special needs gain more independent mobility through the use of customized ride-on cars at no cost to families. Go Baby Go! Milwaukee was started in 2015 as a collaboration between The Orthopaedic & Rehabilitation Engineering Center at Marquette University (OREC/MU, MCW) and Children's Wisconsin (CW), to bring independent mobility to the children of Southeastern Wisconsin. This presentation will discuss the purpose of the program and opportunities for student involvement.

***BRINGING IDEAS TO LIFE:***

***AN INSIDE LOOK AT THE UNIQUE WORLD OF INNOVATION.***

**Room 136**

**Manolo Caballer, VP-Engineering & AD, Kitchen & Bath Group**

**Lun Cheak Tan, VP-Industrial Design, Kitchen & Bath Group**

Kohler leaders reveal how an idea emerges, grows, and blossoms into a product that changes an industry – or the world – and how engineers and designers make it happen.

***CURIOSITY DIDN'T KILL THE CAT; IT HAS JUST MOVED ON TO MORE CREATIVE WORK.***

**Room 236**

**Dr. Douglas E. Melton, Program Director, The Kern Family Foundation**

There's an old adage that "curiosity killed the cat," insinuating that unwanted investigation could lead one to trouble. For a few professions, that might be correct. But for most engineers, curiosity can be a key to success. In this interactive seminar, we will begin with a fun group exercise that will test your curiosity and observational skills. Practicing curiosity is serious play that builds both skills and mental habits.

**BIOMEDICAL ENGINEERING**  
**SENIOR DESIGN PROJECT ORAL PRESENTATIONS**  
**ROOM 136/236**

**SESSION A: ROOM 136**

<b>9:00-9:30</b>	<b>Otoscope for Telemedicine Applications*</b>
Clinical Advisor:	A. Costello, Marquette University College of Nursing
Faculty Advisor:	S. Beardsley
Team Members:	S. Allen J. Contreras Saavedra G. Martinez C. Duong C. McFarlin
MIAD Partners:	H. Anderson E. Udovich
<b>9:30-10:00</b>	<b>Activity Center to Engage Child with Disabilities*</b>
Clinical Advisor:	M. Houser, Menominee Falls School District
Faculty Advisor:	F. Pintar
Team Members:	L. Becker A. Bilyeu C. Smith A. Hruz M. Cote
MIAD Partners:	R. Sell M. Xing
<b>10:00-10:30</b>	<b>Device to Clean Teeth and Remove Plaque*</b>
Clinical Advisor:	A. Bedran-Russo, Marquette University School of Dentistry
Faculty Advisor:	J. Goldberg
Team Members:	G. Rohde A. Thome O. Lutz A. Onufer E. Volk
MIAD Partners:	G. Race J. Ingle

<b>10:30-11:00</b>	<b>Adaptive Gaming Technology Mounting System*</b>
Sponsor:	C. Hege, eClusion, Milwaukee, WI
Faculty Advisor:	B. Silver-Thorn
Team Members:	A. Puchalski Z. Hadzima D. Trimboli A. Richards J. McCarty D. Streff C. Dixon
MIAD Partners:	

<b>11:00-11:30</b>	<b>Mobile Health Solution for Remotely Evaluating Motor Function</b>
Sponsor:	S. Nemanich, Department of Occupational Therapy, Marquette University
Faculty Advisor:	T. Onushko
Team Members:	K. Piper S. Ernst E. Lammers S. Sawalhi R. Cutlan

<b>11:30-12:00</b>	<b>O<sub>2</sub> Saturation Monitor for Telemedicine Applications*</b>
Clinical Advisor:	A. Costello, Marquette University College of Nursing
Faculty Advisor:	D. Cook
Team Members:	J. P. Gomez Postigo A. Doll M. Bradley C. Jaworski A. Mead P. Hartis B. Cole
MIAD Partners:	

<b>1:00-1:30</b>	<b>Model for Teaching Fluid Dynamics of Physiological Processes</b>
Sponsor:	M. Vigil, Department of Physics, Marquette University
Faculty Advisor:	B. Tefft
Team Members:	A. Byrne A. Carani J. Eddinger C. Rogozinski B. Carlson

\*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.

**1:30-2:00**                      **Design Enhancements to Power Stander\***  
Sponsor:                      L. McCarthy  
Faculty Advisor:              B. Stemper  
Team Members:              B. Hughes  
   J. Kaufman  
   T. Kleist  
   O. Lewis  
   G. Buitrago  
MIAD Partners:              N. Duco  
   P. Verdizio

**2:00-2:30**                      **Novel Bone Cement for Repairing Defects in Craniofacial Bones**  
Sponsor:                      B. Wang  
Faculty Advisors:              B. Wang, A. Stellpflug  
Team Members:              D. Vick  
   K. Meza  
   C. Augustyniak  
   R. Bucholc  
   M. Kim

**2:30-3:00**                      **Biocompatible Gaming Mouthpiece\***  
Sponsor:                      C. Hege, eClusion, Milwaukee, WI  
Faculty Advisor:              J. Goldberg  
Team Members:              T. Bresingham  
   C. Celano  
   S. Smith  
   P. Winter  
   R. Quandt  
MIAD Partners:              O. Wilas  
   O. Roth

**3:00-3:30**                      **Hearing Protection for Dentists\***  
Clinical Advisor:              J. Mandigo, Marquette University School of Dentistry  
Faculty Advisor:              S. Audi  
Team Members:              J. Toomey  
   A. Hackett  
   F. Klebba  
   K. Kennedy  
   M. Pisinger

**3:30-4:00**                      **Low-Cost Pressure Regulator to Aid Treatment of Lower Respiratory Infections\***  
Sponsor:                      L. Olson  
Faculty Advisor:              L. Olson  
Team Members:              T. Smith  
   J. Tibbs  
   K. Reyes  
   F. Asuncion  
   T. Kaser

**4:00-4:30**                      **Seating Support for Increased Independence\***  
Sponsor:                      L. McCarthy  
Faculty Advisor:              B. Stemper  
Team Members:              A. Tummala  
   R. Silvera  
   J. Carrasco  
   A. Silva  
   T. Herbst  
MIAD Partners:              N. Ryan  
   K. Chang

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## SESSION B: ROOM 236

**3:00-3:30**                      **Wearable Pulse Oximeter\***  
Clinical Advisors:              A. Morgan-Tautges, C. Schindler, Children's Wisconsin  
Faculty Advisor:              D. Cook  
Team Members:              K. Aragon  
   V. Radermacher  
   A. Pavlenko  
   J. Limson  
   A. Valente

**3:30-4:00**                      **Development of Smart Insect Sampling Unit**  
Sponsors:                      M. Lord, A. Lord, R. Maciel de Freitas, Spectroscopy and Data Consultants, PTY LTD, Australia  
Faculty Advisor:              J. Hokanson  
Team Members:              E. Early  
   G. Gibson  
   A. Johnson  
   D. Parks  
   I. Yoshizaki

\*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.

**4:00-4:30**                      **Device to Improve Balance in Patients with Neurological Disorders**

Sponsor:                      B. Schmit  
Faculty Advisor:            B. Schmit  
Team Members:            M. Boehm  
                                      B. Dirmish  
                                      E. Haag  
                                      B. Kloehn  
                                      N. Ragonese

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**CONFIDENTIAL PROJECTS**

**Project 1**

Sponsor:                      GE Healthcare, Waukesha, WI  
Faculty Advisor:            J. Goldberg  
Team Members:            J. Grosz  
                                      A. Maradiaga  
                                      J. Selkirk  
                                      K. Steuer

**Project 2\***

Clinical Advisors:        R. Chun, S. Shay, Medical College of Wisconsin,  
                                      Children's Wisconsin  
Faculty Advisor:            G. Garcia  
Team Members:            M. Geer  
                                      K. Hughes  
                                      E. Kinnison  
                                      K. McGrath  
                                      C. Naze

**COMPUTER AND ELECTRICAL ENGINEERING  
SENIOR DESIGN PROJECT ORAL PRESENTATIONS  
ROOM 236**

**9:00-9:30**

Sponsor:                      F. Jacoby, Marquette University College of Engineering  
Faculty Advisor:            M. Trawicki  
Team Members:            M. Gonzalez  
                                      J. Hollister  
                                      J. Land  
                                      D. Lyke  
                                      T. Rogus  
                                      M. Siener  
                                      M. Walek

**9:30-10:00**

Sponsor:                      J. Richie, Marquette University College of Engineering  
Faculty Advisor:            J. Richie  
Team Members:            M. Monacelli  
                                      C. Nuttall  
                                      T. Nowak  
                                      C. Schmit  
                                      E. White

**10:00-10:30**

Sponsor:                      T. Sinclair, Sin Emerging Technologies  
Faculty Advisor:            M. Trawicki  
Team Members:            J. Bragado  
                                      J. Burkert  
                                      D. Burmeister  
                                      A. Leinauer  
                                      S. Munoz

**10:30-11:00**

Sponsor:                      T. Sinclair, Sin Emerging Technologies  
Faculty Advisor:            D. Ye  
Team Members:            C. Barcnas  
                                      J. Ethitara  
                                      A. Nicholas  
                                      T. To  
                                      B. Wilke

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

**11:00-11:30 WEAR (WE Energies Augmented Reality) Inspection Assistance**

Sponsor: D. Nestler, WE Energies  
Faculty Advisor: M. Trawicki  
Team Members: M. Awadallah  
A. Beugnet  
N. Broeski  
A. Simon  
R. Yang

**11:30-12:00 A Complete Tool for Analyzing and Detecting Cascading Failures in Electric Power Grids**

Sponsor: M. Hayat, Marquette University Opus College of Engineering and Marquette Energy Analytics  
Faculty Advisor: M. Hayat  
Team Members: N. Arns  
B. Nennering  
J. Popp  
K. Povinelli  
C. Sustar

**1:00-1:30 Satellite Networks Communication Simulation**

Sponsor: J. Gao, Marquette University Opus College of Engineering  
Faculty Advisor: J. Gao  
Team Members: J. Bielinski  
R. Gray  
A. Huynh  
N. Lutz  
N. Schaller

**1:30-2:00 Privio Website Metamask Backend**

Sponsor: D. Hudetz, Privio  
Faculty Advisor: M. Trawicki  
Team Members: D. Faye  
J. George  
R. Gonzalez  
J. Jacob  
S. Torti

**2:00-2:30 Potentiostatic Battery Cell Tester**

Sponsor: A. Spaulding, Milwaukee Tool  
Faculty Advisor: M. Trawicki  
Team Members: M. Alvarez  
B. Angiolo  
Z. Bishop  
A. DeFelippis  
S. Gonzalez

**CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING  
SENIOR DESIGN PROJECT ORAL PRESENTATIONS  
ROOM 323**

**9:00-9:30**

Mentor: T. Parolari, Marquette University Opus College of Engineering  
Team Members: S. Kure  
M. Dupasquier  
C. Deneault  
B. Frenette

**Rainworks Challenge**

**9:30-10:00**

Sponsor: Black & Veatch  
Lead Mentor: J. Kemp  
Other Mentors: D. Diehl, E. Wells, and C. Boland-Prom  
Team Members: S. Kohls  
S. Camarota  
M. Cannon  
B. Ocegüera  
A. Mourikes

**Wastewater Treatment Plant**

**Enhanced Primary Treatment (EPT) Upgrade**

**10:00-10:30**

Sponsor: MSA Professional Services, Inc.  
Lead Mentor: M. Castillo  
Team Members: S. Harvey  
F. Perez Mercado  
A. Gonzalez  
A. Rodriguez

**MSA & the Global Water Stewardship – Montezuma, Cost Rica Centralized Sanitary Wastewater Solution and Collection System Design**

**10:30-11:00**

Sponsor: Findorff  
Lead Mentor: M. Stern  
Team Members: D. Conley-Keck  
M. Hopkins  
J. D'Aloia  
L. Foust

**The Marquette College of Business Administration**

**11:00-11:30 AM**

Sponsor:  
Lead Mentor:  
Other mentors:  
Team Members:

**Drexel Avenue Reconstruction**

R. A. Smith  
A. Stasiukevicius  
J. Bruggeman; A. Axt, J. Diekfuss (P4 Infrastructure)  
T. Garcia Guarneros  
P. Tennant  
N. Jackson  
I. Luevano

**11:30-12:00**

Mentor:  
Team Members:

**Rainworks Challenge**

W. McDonald, Marquette University Opus College of Engineering  
Z. Meyer  
M. Weltzien  
J. Zwiefelhofer  
J. Branca  
A. Kimmert

**1:00-1:30**

Sponsor:  
Lead Mentor:  
Team Members:

**Marquette University College of Business Administration**

Findorff  
M. Stern  
L. McEniry  
W. Grafft  
P. Donnellan  
K. Williams

**1:30-2:00**

Sponsor:  
Lead Mentors:  
Team Members:

**ARCO Design/Build Project**

ARCO Design/Build  
J. Stefan and T. Hefferon  
M. Keller  
J. Garcia  
C. Aguirre  
B. Cooke  
A. Morrison

**2:00-2:30 PM**

Sponsor:  
Lead Mentor:  
Other Mentors:  
Team Members:

**New Construction on Existing Conditions**

Thornton Tomasetti and Gilbane Building Company  
T. Kalayil and A. Roy  
E. Diels and A. Gesior  
W. Olsen  
E. Turski  
E. Davies  
J. Hopp

**2:30-3:00**

Sponsor:  
Lead Mentors:  
Other Mentors:  
Team Members:

**New Construction on Existing Conditions**

Thornton Tomasetti and Gilbane Building Company  
T. Kalayil and A. Roy  
E. Diels and A. Gesior  
G. Lukanus  
M. Pook  
C. Steffens  
J. Collard

**3:00-3:30**

Sponsor:  
Lead Mentor:  
Team Members:

**MSA & the Global Water Stewardship – Montezuma, Cost Rica Centralized Sanitary Wastewater Solution and Collection System Design**

MSA Professional Services, Inc.  
M. Castillo  
N. Collins  
J. Stoll  
J. Thom  
C. Zumm

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**MECHANICAL ENGINEERING**  
**SENIOR DESIGN PROJECT ORAL PRESENTATIONS**  
**ROOM 128**

**9:00-9:30**                      **A Low-cost Stethoscope for Developing Countries**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:            V. Cariapa  
Team Members:            A. Beyer  
   B. Bouwhuis  
   J. Kozin  
   O. Miller  
   M. Olding  
   J. Salas

**9:30-10:00**                   **A 4-bar Linkage for Studying Dynamics Efficiently**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:            R. Crowley  
Team Members:            C. Dorn  
   N. Halaseh  
   J. Strohbeck

**10:00-10:30**                 **NASA Mars Lunabotics 2022**  
Sponsor:                      NASA, Wisconsin Space Grant Consortium  
Faculty Advisor:            P. Voglewede  
Team Members:            T. Carrasco  
   B. Charles  
   C. Hohl  
   P. Larkin  
   J. Listowski  
   E. Marinic  
   C. Piszczek  
   J. Podhola  
   J. Stinehart  
   A. Yakisan

**10:30-11:00**                 **Low-cost Water Purifier for Developing Countries**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:            V. Cariapa  
Team Members:            G. Beltran  
   W. Cruz  
   C. Lindsay  
   F. San Andres Aquado  
   J. Weiss

**11:00-11:30**                   **Rocket for Exploring Biomedical Research at an Altitude of 10,000 Feet**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:            A. Bowman  
Team Members:            S. Keller  
   C. Martinez  
   P. Naumann  
   W. Nikolay  
   T. Mark  
   Z. Thompson

**11:30-12:00**                 **Collapsible Bicycle**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:            A. Murray  
Team Members:            J. Aguirre  
   T. Mertes  
   D. Skaff  
   T. Winger  
   A. Zulfer

**1:00-1:30**                      **Designing Devices to Protect Toddlers**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:            V. Cariapa  
Team Members:            E. Catalan  
   J. Locy  
   Z. Martin  
   B. Stevenson  
   D. Tabares-Zamaro

**1:30-2:00**                      **An Exoskeleton that Assists Humans in Performing Difficult Physical Tasks**  
Sponsor:                      Marquette University Opus College of Engineering and student-team  
Faculty Advisor:            V. Cariapa  
Team Members:            D. Czaplá  
   J. Foley  
   N. Palomino  
   D. Schumann  
   A. Walker

**2:00-2:30**                      **A High Pressure, High Flow Rate, Movable Test Station**  
Sponsor:                      Sentry Equipment Corporation  
Faculty Advisor:            A. Bowman  
Team Members:            G. Bascunansimone  
   L. Chun  
   B. Iling  
   S. Monroy  
   E. Romaniz

**3:00-3:30**                      **Predictive Sensors of Gait-analysis of Middle-aged Walkers**  
Sponsor:                      Marquette University Opus College of Engineering  
Faculty Advisor:              V. Cariapa  
Team Members:              K. Chapman  
   T. Frost  
   C. Kwasigroch  
   C. Lopez  
   C. Murphy  
   E. Zeledon

**3:30-4:00**                      **Innovative Pedestrian Pathway**  
Sponsor:                      Marquette University Opus College of Engineering,  
   B. Quincey, J. Schindler  
Faculty Advisor:              V. Cariapa  
Team Members:              C. Halfpenny  
   A. Jiang  
   C. Mahon  
   J. Ramos  
   G. Roche  
   Z. Sandstrom

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**CONFIDENTIAL PROJECTS**

**Project 1**  
Sponsor:                      Husco International Inc.  
Faculty Advisor:              J. Borg  
Team Members:              M. Dauner  
   M. Duetsch  
   G. Geiser  
   K. Wollenberg

**Project 2**  
Sponsor:                      Milwaukee Electric Tool Corp.  
Faculty Advisor:              V. Cariapa  
Team Members:              J. Frye  
   J. Ho  
   M. Dixon  
   M. Adlington

**Project 3**  
Sponsor:                      Milwaukee Electric Tool Corp.  
Faculty Advisor:              J. Schimmels  
Team Members:              N. Beine  
   B. Herwig  
   R. Jimenez  
   E. Recendez  
   D. Sabir.

**Project 4**  
Sponsor:                      First Coast Golf Academy  
Faculty Advisor:              V. Cariapa  
Team Members:              E. Bustillos  
   T. Butz  
   K. Flanagan  
   L. Mora  
   C. Schaul  
   O. Stewart  
   S. Wildsorf

**Project 5**  
Sponsor:                      Modine Manufacturing  
Faculty Advisor:              A. Bowman  
Team Members:              N. Altandush  
   F. Arenal  
   M. Coy  
   J. Ronsman

**Project 6**  
Sponsor:                      Student-Entrepreneur  
Faculty Advisor:              H. Park  
Team Members:              V. Scherba  
   S. Schwab  
   Z. Spaeth  
   L. Velez

**Project 7**  
Sponsor:                      Milwaukee Electric Tool Corp.  
Faculty Advisor:              V. Cariapa  
Team Members:              J. Knox  
   M. Dieck  
   H. Ward  
   O. Waldron

**Dear Graduating Seniors,**

Congratulations on your upcoming graduation!

We in the Opus College of Engineering have watched you transform from freshman engineering students into dedicated, ethical, and mission-driven engineers with a desire to serve others. Allow this mission to guide you and remain open to continued growth and transformation. You are the difference; go forth and set the world on fire.

We know that your career will benefit from the same commitment and effort that you devoted to your academic work. We wish you the best!

Warmest Regards,  
Opus College of Engineering faculty and staff



**OPUS**

College of Engineering

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MARQUETTE UNIVERSITY