Capstone Design CONFERENCE 2016

JUNE 6-8, 2016 ▸ COLUMBUS, OHIO

CONFERENCE PROGRAM

The Ohio State University

www.capstoneconf.org

IEEE
STANDARDS UNIVERSITY

Innovation • Compatibility • Success

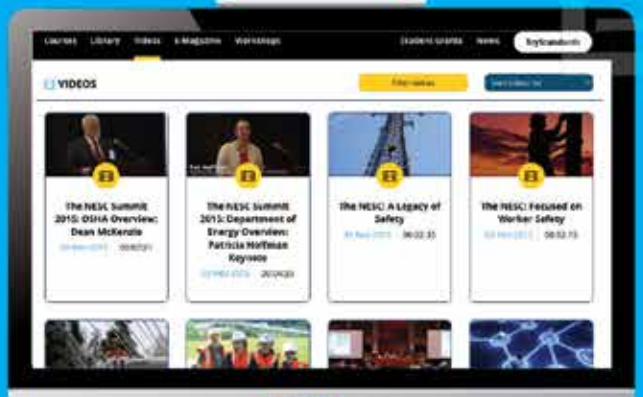
An Educational Platform Enabling You to Advance Your Skills

The IEEE Standards University is the place to find great standards education content and resources for educators, students and professionals focusing on:

- the development and use of standards;
- the impact of standards on business;
- an understanding of patents and standards;
- and the role of conformity assessment.

Explore innovative elements—including eLearning courses and MOOCs, a video library, workshops, and more. Discover a wealth of educational resources, materials and tools at StandardsUniversity.org.

Courses



Videos

Workshops

StandardsUniversity.org

IEEE

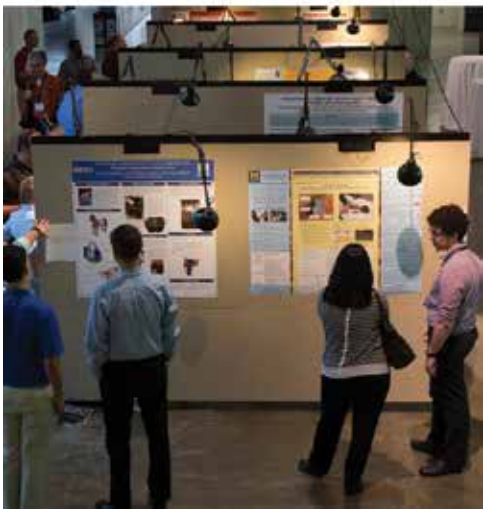
Conference Overview

Monday, June 6, 2016

7:00 – 8:30 a.m.	Registration / Continental Breakfast
8:30 – 10:00 a.m.	Opening Session
10:30 a.m. – 12:00 p.m.	Panel & Workshop Session 1
12:15 – 1:45 p.m.	Keynote Lunch
2:00 – 3:30 p.m.	Panel Session 2
4:00 – 5:30 p.m.	Poster Session 1
6:00 p.m.	Workshop Session 2 (with box dinner)
8:00 – 9:30 p.m.	News and Brews

Tuesday, June 7, 2016

7:00 – 8:30 a.m.	Registration
7:30 – 12:30 p.m.	Local Tours and Activities
7:00 – 9:00 a.m.	NSF "Office Hours"
9:00 – 10:30 a.m.	Workshop Session 3
10:45 a.m. – 12:15 p.m.	Workshop Session 4
12:30 – 2:00 p.m.	Birds of a Feather Lunch
2:15 – 3:45 p.m.	Panel Session 3
4:00 – 5:30 p.m.	Poster Session 2
6:00 p.m.	Workshop Session 5 (with box dinner)
8:00 – 9:00 p.m.	Dessert Break



Wednesday, June 8, 2016

6:30 – 7:30 a.m.	Informal Walk/Run
8:00 – 9:00 a.m.	Registration / Continental Breakfast
9:00 – 10:30 a.m.	Panel Session 4
11:00 a.m. – 12:30 p.m.	Panel Session 5
12:45 – 2:00 p.m.	Closing Lunch and Next Steps

CAPSTONE WELCOME

Welcome
from the Co-Chairs

Greetings! On behalf of the entire Capstone Design Conference Organizing Committee we welcome you to Columbus, OH for the 2016 Capstone Design Conference!

We are thrilled to continue the success of the previous capstone conferences and to continue building a community of educators, students, and industry to discuss, analyze, and improve capstone design education. As with the previous capstone conferences, this conference is intentionally designed to promote discussion and interaction across the capstone community. In other words, welcome to a conference at which you will get a chance to confer! As capstone design educators and consumers, we appreciate the importance of understanding our own challenges, the need to look outside our own organization to find new ways to continuously improve, and the value of experiencing failure – occasionally. At the 2016 Capstone Conference, you will find opportunities to share and learn about all of these!

In contrast to the traditional podium presentation format, this conference instead features two conference-wide poster sessions (including both posters *about* capstone design and posters *by* capstone design teams) to encourage vibrant and extensive sharing of ideas and experiences. Based on themes that emerged from our planning session at the 2015 ASEE conference, and from the selection of 2016 Capstone Conference accepted papers and posters, we have created a series of interactive panel discussion topics related to capstone design. In addition, a range of workshops will provide attendees hands-on opportunities to learn new skills and strategies to improve their own capstone design programs. Finally, look for a series of quests designed to help you network with other attendees, learn a little bit about our host institution, The Ohio State University, and get the most out of the conference.

The 2016 conference continues the tradition of student involvement, reflecting students' key role in capstone design. Keep an eye out for featured capstone student projects in the poster session as well as invited student participation in many of the panel sessions. We are grateful to the contributions of our many conference sponsors, exhibitors, and advertisers who support the conference and help us keep our conference fees as low as possible.

So, again, welcome! Please take the opportunity to immerse yourself in this conference; expand your capstone network, exchange ideas, and empower your involvement with capstone design courses. We thank you for attending the 2016 conference – we welcome feedback on conference effectiveness and encourage you to spread the word. We look forward to collaborating with you now and in the future!

– Renee Rogge and Beth DeBartolo, co-chairs


Beth


Renee

Organizing Committee

Renee Rogge, co-chair	Rose-Hulman Institute of Technology
Beth DeBartolo, co-chair	Rochester Institute of Technology
Steve Beyerlein, Workshops	University of Idaho
Patsy Brackin, Panels	Rose-Hulman Institute of Technology
Jay Goldberg, Industry Involvement	Marquette University
Robert Hart, Papers	University of Texas-Dallas
Amy Hortop, Student Involvement	University of Michigan
Susannah Howe, Communications	Smith College
Junichi Kanai, Member-at-Large	Rensselaer Polytechnic Institute
Cameron Lindsey, Local Organizing	The Ohio State University
Glen Livesay, Special Sessions	Rose-Hulman Institute of Technology
Scott Palo, Webmaster	University of Colorado-Boulder
Peter Rogers, Local Organizing	The Ohio State University
Shraddha Sangelkar, Posters	Penn State-Erie
Alisha Sarang-Sieminski, Quests	Olin College
Keith Stanfill, Fundraising	University of Florida
Jim Vallino, CMT	Rochester Institute of Technology
Steve Zahos, Fundraising	University of Illinois at Urbana-Champaign

All campus photos courtesy of The Ohio State University

Quests

What is better than having a little fun and being a little silly at a professional conference? The great success of Quests from the 2014 Capstone Design Conference led us to continue to support the spirit of play and give gentle nudges to engage with other participants in fun ways by bringing back Quests for a second round! The quests are designed to encourage participants to fully experience the conference, make social and networking connections that otherwise might not occur, explore some local activities, and generally have fun. Look for the Quest Center table in the Exhibit Hall on the 3rd floor of Pfahl Hall to get more information and claim prizes or be entered into prize raffles based on the quests you've completed. And look for evidence of completed quests on people's name tags to find others engaging in quests.

Exhibitors

Gold-Level Sponsors:

ASEE-DEED

IEEE

National Instruments

VentureWell

Silver-Level Sponsor:

ASTM International

Sponsors:

KEEN

OnShape

PMI

Verity Design Learning

Exhibits will be open on the 3rd floor of Pfahl Hall throughout the conference:
Monday 10am-6pm, Tuesday 8:30am-6pm, and Wednesday 9am-2pm.

Capstone Conversation

Don't forget! Contribute your "most important takeaways" sticky notes at the end of each panel session.

Capstone Design
CONFERENCE 2016
JUNE 6-8, 2016 ▸ COLUMBUS, OHIO

ABOUT CAPSTONE

Capstone Overview

The goal of the Capstone Design Conference is to provide a forum for the engineering and applied science capstone community to share ideas about implementing and improving design-based capstone courses. Conferences are held biannually in even years.

Through the four previous Capstone Design Conferences, we have established a network of capstone design educators and associated stakeholders committed to supporting one another in implementing various capstone course models, managing teams and projects, engaging stakeholders, incorporating new technology and collaborating to identify and disseminate effective practices in capstone design education. We welcome the 2016 conference attendees into this friendly and talented community.

As an outcome of the 2007, 2010, 2012, and 2014 conferences, we published an extensive set of peer-reviewed articles about capstone pedagogy in special issues of the *International Journal of Engineering Education* (IJEE, vol. 27-6, vol. 30-1, and vol. 31-6B). We intend to pursue another special issue of IJEE following the 2016 conference. We invite you to join us in our quest for shared excellence in capstone design instruction.

Agenda

DAY 1 — Monday, June 6, 2016

7:00 a.m. – 8:30 a.m. **Registration / Continental Breakfast** — Blackwell Lobby, 2nd floor

8:30 a.m. – 10:00 a.m. **Opening Session** — Ballroom

10:00 a.m. – 10:30 a.m. **Break**

10:30 a.m. – 12:00 p.m. **Panel Session 1**

Panel 1A: Entrepreneurship in Capstone Design — Pfahl 230

Facilitator: John Ochs, Lehigh University

Panelists: Sean Carroll, Georgia Institute of Technology; Jay Goldberg, Marquette University; Victoria Matthew, VentureWell; Doug Melton, Kern Entrepreneurial Engineering Network; Elizabeth Schmitt, Florida Institute of Technology

Capstone provides a natural opportunity for students to engage in entrepreneurial activities. In this panel, a mix of students and professionals will discuss best practices in supporting and encouraging student entrepreneurs.

Panel 1B: Enhancing Capstone Success I — Pfahl 202

Facilitator: John Peeples, The Citadel

Panelists: Jered Dean, Colorado School of Mines; George Fleming, University of Texas-Dallas; Gregory Kremer, Ohio University; Nathan Scott, Johns Hopkins University

Nationally recognized capstone programs will share course practices that enhance the success of the programs. Topics covered include best practices in skill development, using junior assistants, developing common models, design team facilitation, assessment, etc.

Panel 1C: Roles & Responsibilities in Capstone Design — Pfahl 330

Facilitator: Brian Novoselich, Virginia Tech

Panelists: Terence Jordan, University of North Carolina-Charlotte; Neil Littell, Ohio University; Robert Stwalley, Purdue University

There are many participants in capstone - students, TAs, corporate sponsors, project advisors, course instructors, and mentors. How do you define roles so that students are successful?

10:30 a.m. –12:00 p.m. **Workshop Session 1**

Workshop 1A: Capstone Product Idea Generation with Design Heuristics — Scott Lab (E100)

Capstone Product Idea Generation with Design Heuristics

Facilitators: Keelin Leehy, Iowa State University; Shanna Daly, University of Michigan; and Seda Yilmaz, Iowa State University

The 77 cards in the Design Heuristics for Inspiring Ideas toolbox can be used to support design teams in generating more diverse and creative ideas in their capstone projects. This workshop will introduce this research-grounded ideation tool and overview of multiple lesson versions for integrating this tool into capstone course activities.

12:15 p.m. – 1:45 p.m.

Keynote Luncheon: The 2015 Capstone Design Decennial Survey: Current Practices and Trends over Time — Ballroom

Speaker: Susannah Howe, Smith College

Susannah Howe, Ph.D., is the Design Clinic Director in the Picker Engineering Program at Smith College, where she coordinates and teaches the capstone engineering design course. Her current research focuses on innovations in engineering design education, particularly at the capstone level. She is invested in building the capstone design community; she is a leader in the biannual Capstone Design Conferences and the Capstone Design Hub initiative. She is also involved with efforts to foster design learning in middle school students and to support entrepreneurship at primarily undergraduate institutions. Her background is in civil engineering with a focus on structural materials. She holds a B.S.E. degree from Princeton, and M.Eng. and Ph.D. degrees from Cornell.

Inspired by the first national survey of capstone design programs in 1994 by Bob Todd and colleagues at BYU, Susannah conducted a similar comprehensive survey in 2005 and again in 2015. These decennial surveys capture data about capstone course information, pedagogy, evaluation, faculty, students, projects and teams, expenses and funding, and sponsors. This keynote talk reports on data from the 2015 survey and also provides longitudinal comparisons for context. Collectively, the data capture common practices as well as the variety of implementation strategies within capstone design programs.

2:00 p.m. – 3:30 p.m.

Panel Session 2

Panel 2A: Project Management in Capstone Courses — Pfahl 230

Facilitator: Ada Hurst, University of Waterloo

Panelists: Ashley Forsythe, Project Management Institute; Samuel Malachowsky, Rochester Institute of Technology; Alisha Sarang-Sieminski, Olin College; Baldur Steingrimsson, Portland State University

Project management is a critical component of any capstone experience, but it is often overlooked in favor of the "technical" challenges that teams are more comfortable confronting. Panelists will share the project management tools they use in their capstone courses and techniques for encouraging students to use them.

Panel 2B: ABET and Capstone Design — Pfahl 202

Facilitator: John Mirth, Rose-Hulman Institute of Technology

Panelists: Denny Davis, The Ohio State University; John Estell, Ohio Northern University; Benjamin Lutz, Virginia Tech

Many programs rely heavily on capstone design courses for assessing ABET outcomes. Join this panel to participate in a discussion of current assessment practices and get in on the discussion of how things may change in the future!

Panel 2C: Tips for Teaching Capstone Design — Pfahl 330

Facilitator: Steve Beyerlein, University of Idaho

Panelists: Junichi Kanai, Rensselaer Polytechnic Institute; Keith Stanfill, University of Florida; Steve Zahos, University of Illinois

Teaching capstone design is "different"! Join experienced panelists as they discuss some of the perks and perils of teaching design with new design instructors and how it is "different" from teaching a discipline-specific course.

Panel 2D: Encouraging Creativity in Capstone Design — Pfahl 302

Facilitator: Steve Chenoweth, Rose-Hulman Institute of Technology

Panelists: Keelin Leahy, University of Limerick; Dan Phillips, Rochester Institute of Technology; Stan Rickel, Rochester Institute of Technology; Allen White, Rose-Hulman Institute of Technology

Can creativity be taught? How can you encourage engineering students to participate in the creative process? This panel will discuss approaches for encouraging creativity in capstone design.

3:30 p.m. – 4:00 p.m. **Break**

4:00 p.m. – 5:30 p.m. **Poster Session 1** — CBEC Lobby

Food and beverages will be available while you browse the posters and chat with the authors in the beautiful Chemical and Biomolecular Engineering and Chemistry (CBEC) Building Lobby.

5:30 p.m. – 6:00 p.m. **Break**

6:00 p.m. **Workshop Session 2 (with box dinner)**

Workshop 2A: IEEE Standards Education Presents: IEEE Workshop on Technical Standards and Consensus Building — Pfahl 202

Facilitators: James Irvine, University of Strathclyde; Jennifer McClain, IEEE; Susan Tatiner, IEEE; James Olshefsky, ASTM International

During this evening workshop, representatives of the IEEE Standards Education Committee will facilitate an interactive consensus-building exercise in which attendees take on the roles of different members of a standards working group tasked with developing a new technical standard. The workshop demystifies how standards are developed and used, and provides ideas how capstone instructors can bring industrial standards that students are likely to encounter in the workplace into classroom and design suite experiences.

Workshop 2B: Capstone Project Scoping & Negotiation with Prospective Clients — Pfahl 302

Facilitators: Chuck Pezeshki, Washington State University; Steve Beyerlein, University of Idaho

Starting the relationship between industrial sponsors and a capstone instructor is an important, but overlooked first step in running a successful externally focused capstone program. In this workshop, participants will examine new approaches for dialoguing with potential sponsors about appropriate project scope and suitable levels of financial support. This will include a prospecting template that has been used successfully by the workshop facilitators to secure over $2M in funding for capstone projects over the last ten years. Major topics that will be covered are: Assessment of project difficulty using NASA Technology Readiness Levels (NASA TRLs), Negotiation for Early Agreement, and understanding the Arc of the Project. As with all Pezeshki/Beyerlein workshops, this one will incorporate active, energetic and enjoyable participation with numerous role-playing and simulation sub-sessions. Some modest amount of pre-work will be highly recommended for maximum learning impact.

Workshop 2C: Using the Constraint Source Model to Manage ABET Design Expectations — Pfahl 230

Facilitators: John K. Estell, Ohio Northern University; Ken Reid, Virginia Tech

In preparation for our students' "major culminating design experience," how can we best present how constraints affect design such that it more than just checking off the laundry list of terms found in ABET EAC Criterion 3(c)? The purpose of this workshop is to present a framework to the capstone community for review, discussion, and refinement where the constraints affecting a design are modeled as being derived from business-, customer-, societally-, and technically-driven sources – in other words, as being derived from reality. Resources developed in support of this framework will be applied toward identifying the design constraints in two planned activity sessions. Both activity sessions will be followed by facilitated discussion sessions. Workshop leaders include an ABET expert with both program evaluator and commissioner experience, and a director of multiple undergraduate programs with experience in pedagogical development and studying student success.

8:00 p.m. – 9:30 p.m. **News and Brews** — Pfahl Patio

This informal session (with drink!) will provide an opportunity for capstone "newbies" to connect with more seasoned capstone colleagues for casual conversation. Whether you're new to capstone or have been around the capstone block (or you just like microbrews!), you are welcome to join in the discussion.

DAY 2 — Tuesday, June 7, 2016

7:00 a.m. – 8:30 a.m. **Registration & Continental Breakfast** — Blackwell Lobby, 2nd floor

7:30 a.m.– 12:30 p.m. **Local Tours and Activities**

See program insert for local information and activities available in the OSU area this week!

9:00 a.m. – 10:30 a.m. **Workshop Session 3: Rapid Design of Embedded Systems and Projects with NI myRIO** — Pfahl 202

Facilitators: Mark Walters and Eric Dean, National Instruments

This hands-on workshop seeks to familiarize educators and students with embedded technology to complete real-world design projects in one semester or less. Find out how your students can develop real, complex engineering systems more quickly using an embedded hardware device with a dual-core ARM® Cortex™-A9 real-time processor and customize I/O with a Xilinx FPGA

10:45 a.m. –12:15 p.m. **Workshop Session 4: Hands-on Workshop with MATLAB, Simulink, and Raspberry Pi** — Pfahl 302

Facilitator: Balaji Sharma, MathWorks

This hands-on workshop introduces users to MATLAB and Simulink for developing and deploying algorithms with low-cost hardware, such as the Raspberry Pi, for use in engineering education as well as Capstone Design projects.

12:30 a.m. – 2:00 p.m. **Birds of a Feather Lunch (box lunch, open seating by topics of interest)**

Please refer to the program insert for a list of topics & locations for each lunch discussion group. A sign-up sheet is located at the registration table!

2:15 p.m. – 3:45 p.m. **Panel Session 3**

Panel 3A: Enhancing Capstone Success II — Pfahl 202

Facilitator: Glen Livesay, Rose-Hulman Institute of Technology

Panelists: Jay Goldberg, Marquette University; Robert Hart, University of Texas-Dallas; Susannah Howe, Smith College; Sophia Poulos, Smith College

Nationally recognized capstone programs will share course practices that enhance the success of the programs. Topics covered include best practices in course design, project selection, design team facilitation, assessment, etc.

Panel 3B: Capstone Expos — Pfahl 302

Facilitator: Amit Jariwala, Georgia Tech

Panelists: Ara Arabyan, University of Arizona; Thomas Barber, University of Connecticut; Bennett Ward, Virginia Commonwealth University

Capstone expos are an exciting way for students to conclude their capstone design experience. They also provide an opportunity for the broader community to see what engineering students have accomplished. The panel (and conference attendees) will discuss best practices in coordinating design expos.

Panel 3C: International Capstone Projects — Pfahl 230

Facilitator: John Aidoo, Rose-Hulman Institute of Technology

Panelists: Megan Bouret, North Dakota State University; Carsten Kleiner, Hochschule Hannover; Dean Knudson, North Dakota State University; Fabian Volkert, Hochschule Hannover

International capstone projects provide a unique set of opportunities to students and faculty. Panel members will discuss their experiences with international projects. Conference attendees interested in starting an international project are encouraged to attend and participate!

Panel 3D: Design Challenges & Competitions — Pfahl 330
Facilitator: Bridget Smyser, Northeastern University
Panelists: Noa Flaherty, OnShape; Roseann Thompson, New Mexico State University; Bob Rhoads, The Ohio State University

Competition projects present different design challenges than "traditional" capstone projects. Join the panelists as they discuss their experiences and share tips and tricks for successful Design Competition experiences.

4:00 p.m. – 5:30 p.m. **Poster Session 2** — CBEC Lobby

Food and beverages will be available while you browse the posters and chat with the authors in the beautiful Chemical and Biomolecular Engineering and Chemistry (CBEC) Building Lobby.

5:30 p.m. – 6:00 p.m. **Break**

6:00 p.m. **Workshop Session 5 (with box dinner)**

Workshop 5A: User-Oriented Assessment Tools for Industry-Sought Learning Outcomes in Capstone Design — Pfahl 330
Facilitators: Denny Davis, The Ohio State University; Lin Ding, The Ohio State University; Peter Rogers, The Ohio State University

As a component of an ongoing National Science Foundation-funded project, workshop participants will work together in teams to draft assessment tools for selected learning outcomes in capstone design courses. Outcomes will be selected based on importance to employers, while tools will be designed to give greatest benefits to students and faculty.

Workshop 5B: Reflection in Engineering Courses: Focus on Capstone — Pfahl 302
Facilitators: Kristine Csavina and Adam Carberry, Arizona State University

This workshop is intended to stimulate interest in the use of reflection in engineering capstone courses. We will discuss what it means to reflect as a learner, introduce resources created by the Consortium to Promote Reflection in Engineering Education (CPREE), and share ideas for reflective activities/assignments in capstone courses.

8:00 – 9:00 p.m. **Dessert Break** — 3rd Floor Pfahl Lobby

Capstone Conversation

Describe your most satisfying capstone project experience to another attendee.

Capstone Conversation

What is the craziest thing you've ever heard spoken in a capstone team meeting?

DAY 3 — Wednesday, June 8, 2016

6:30 a.m. – 7:30 a.m. **Run/Walk** — Meet in the Blackwell Lobby

An informal gathering of attendees who are interested in taking a walk or run around the OSU campus. Can't make the group meeting? Check out http://recsports.osu.edu/facilities/outdoor-facilities for some running/walking trails around the campus!

8:00 a.m. – 9:00 a.m. **Registration / Continental Breakfast** — Blackwell Lobby, 2nd floor

9:00 a.m. – 10:30 a.m. **Panel Session 4**

Panel 4A: Corporate Sponsored Projects — Pfahl 302
Facilitator: Charles Pezeshki, Washington State University
Panelists: Douglas Chickarello, Clemson University; Meghan Daly, James Madison University; Leesa Duckworth, Pacific Northwest National Laboratory; Shraddha Sangelkar, Penn State-Erie

How do you work with companies to enhance the experience for students, faculty, and the company, too? Join this panel for an informative session that will address many concerns for corporate sponsored projects.

Panel 4B: Systems Engineering in Capstone Design — Pfahl 330
Facilitator: Fred Looft, Worcester Polytechnic Institute
Panelists: Bill Fortney, North Carolina State University; Scott Kirkpatrick, Rose-Hulman Institute of Technology

Systems engineering methods are critical to the successful development of any complex system. Panelists will discuss ways to incorporate systems engineering concepts and tools into any capstone experience.

Panel 4C: What I Wish I Had Known... — Pfahl 140
Facilitator: Patsy Brackin, Rose-Hulman Institute of Technology

An open student panel, with representatives from multiple schools and disciplines, will share their capstone design experiences and reflect on their preparation.

Panel 4D: Multidisciplinary Model for Capstone Success — Pfahl 340
Facilitator: Robert Hart, University of Texas-Dallas
Panelists: Jeff Arrington, Abilene Christian University; Beth DeBartolo, Rochester Institute of Technology; Summer Garland, University of Arizona; Abhinav Gautam, Carnegie Mellon University; Todd Polk, University of Texas-Dallas

Nationally recognized capstone programs that involve multi-disciplinary projects will share best practices in course design, project selection, design team facilitation, and assessment.

10:30 a.m. – 11:00 a.m. **Break**

11:00 a.m. – 12:30 p.m. **Panel Session 5**

Panel 5A: Nifty Ideas and Surprising Flops — Pfahl 302
Facilitator: Susannah Howe, Smith College

This rapid-fire session will feature a collection of "nifty ideas" and "surprising flops" from capstone design. Each presenter will briefly share a nifty/flop, followed by Q&A from the audience. Time permitting, walk-ons from the audience will be welcome - bring an idea to contribute!

Panel 5B: Prototyping in Capstone — Pfahl 330

Facilitator: Peter Rogers, The Ohio State University

Panelists: Soraya Bailey, Johns-Hopkins University; John Mirth, Rose-Hulman Institute of Technology; Vito Moreno, University of Connecticut

Prototyping is useful in conceptualization and design proof of concept. Resources to support prototyping activities are discussed, along with the timing of various prototyping activities.

Panel 5C: Difficult Conversations — Pfahl 140

Facilitator: Renee Rogge, Rose-Hulman Institute of Technology

Panelists: Ashley Bernal, Rose-Hulman Institute of Technology; Bridget Smyser, Northeastern University; Keith Stanfill, University of Florida

One of the challenges of teaching design is the difficult conversations that a design instructor sometimes has to have with teams or team members. Join your capstone colleagues in a dynamic session where we role-play some situations and discuss strategies for helping faculty manage these difficult conversations.

Panel 5D: EPICS Panel — Pfahl 340

Facilitator: Maeve Drummond, Purdue University

Panelists: William Oakes, Purdue University; Carla Zoltowski, Purdue University

Civic and community engagement can add an extra dimension to the learning experience in capstone. Panelists will discuss their institutional approaches to integrating community engagement into their capstone courses, including topics such as customer relationships, communication, and assessment.

12:45–2:00 p.m. **Closing Lunch and Next Steps** — Ballroom

Capstone Conversation

What's the best change you ever made to your capstone course?

POSTER SESSION

PROFESSIONAL POSTERS — Alphabetical by Last Name

Poster ID's, M# or T#, correspond to the featured day (Mon. or Tues.) and location within the poster area.

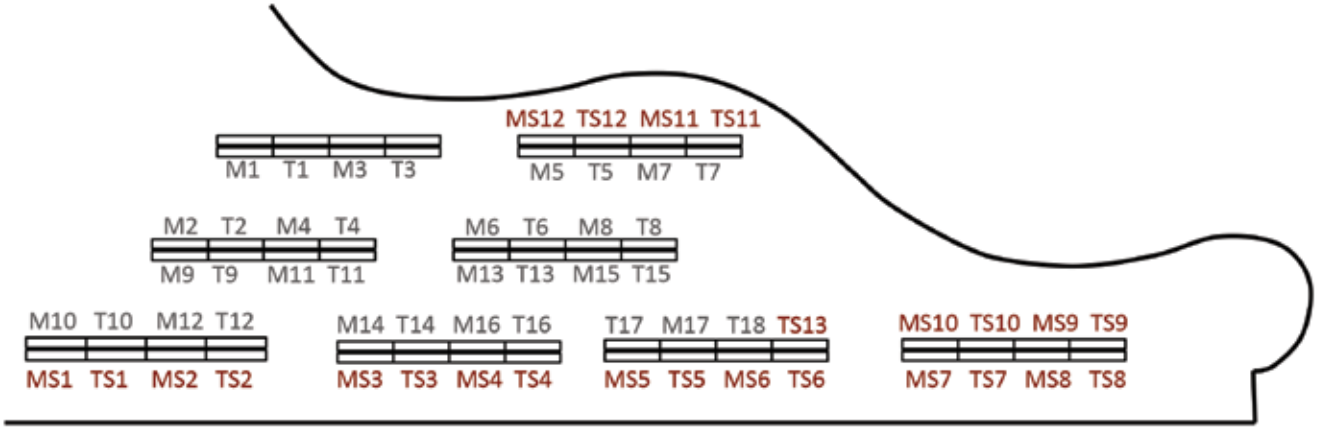
	Primary Contact Author	Title	Poster ID
A	Alexander, David	Enhancing Cross-disciplinary Collaboration and Innovation for Engineering and Business Student Teams	T4-ID56
	Alvarez Fuentes, Manuel	Experiences in Capstone Projects for Industrial Designers	T12-ID46
	Arabyan, Ara	The Interdisciplinary Engineering Design Program at the University of Arizona	T2-ID12
B	Bailey, Soraya	Interdisciplinary Prototype-Building Workshops	T1-ID50
C	Cyders, Timothy	Classroom Integration of the Slack Team Collaboration Tool	M4-ID52
D	Dean, Jered	Supporting Multidisciplinary Programs through Common Language and Modular Instruction	T3-ID43
	DeBartolo, Elizabeth	Performance vs. Requirements: Team and Customer Perspectives	T11-ID41
E	Estell, John	Work in Progress: Harmonizing Senior Design Projects between Engineering Departments	T4-ID33
G	Goldberg, Jay	Lessons Learned from a 10-Year Collaboration Between Engineering and Industrial Design Students in Capstone Design Projects	T5-ID29
	Gronski, Diana	Capstone Design Courses Incorporating the Optimal Problem Specification Tool	T18-ID58
H	Hart, Robert	An Examination of the Factors that Influence Students' Capstone Project Choices	T17-ID44
	Howe, Susannah	2015 Capstone Design Survey – Initial Results	M16-ID28
	Hurst, Ada	Student Perceptions of Value of Peer and Instructor Feedback in Capstone Design Review Meetings	M1-ID10
	Hurst, Ada	Project Management in Capstone Design Courses: Student Choices of Current Technologies	M2-ID8
J	Jassim, Emad	An Entrepreneurial Capstone Design Option: U of I MechSE Innovation Trophy Competition	M12-ID61
	Jordan, Terence	Industry Supported Projects - Managing Differing Expectations	M5-ID26
K	Knudson, Dean	International Capstone Exchange – the SUT and NDSU Experience	M14-ID11
	Kremer, Gregory	Professional Presentation Skill Development Process in a Capstone Design Experience	T15-ID15
L	Littell, William	Leveraging Automatic Identification and Data Capture in an Undergraduate Engineering Technology Capstone Course	M17-ID47
	Lutz, Benjamin	Student Perceptions of Capstone Learning Outcomes	T13-ID27
M	Matthew, Victoria	Using an Importance versus Practice Matrix to Understand How and Why Faculty Integrate Entrepreneurship into Capstone Design	M11-ID36
	Morkos, Beshoy	Teaching Students Designer Empathy in Senior Capstone Design	T14-ID62
N	Novoselich, Brian	Leadership in Capstone Design Teams: Contrasting the Centrality of Advisors and Graduate Teaching Assistants	M8-ID24
P	Peeples, John	Small Things to Enhance Capstone Success	T9-ID39
	Phillips, Daniel	Effective Access Technology Project Discovery	T16-ID49
	Pierrakos, Olga	Building Strong Academic Mindsets Focusing on Grit, Mastery Orientation, Belonging, and Self-Efficacy via an Effort Contingent Learning Environment in a Senior Engineering Capstone Design Course	T7-ID51
S	Sarang-Sieminski, Alisha	Agile/Scrum for Capstone Project Management	M3-ID48
	Scott, Nathan	Junior Assistants in Senior Design Teams	M13-ID40
	Smyser, Bridget	Group Formation and Performance of International Students in Capstone Groups	M10-ID34
	Steingrimsson, Baldur	A Digital Ecosystem for Learning and Team Design	M9-ID21
	Stwalley, Robert	Professional Career Skills in Senior Capstone Design	T10-ID22
	Summers, Joshua	Motivations and Perceptions of Capstone Benefits for Industry Sponsors and Academic Advisors: A Retrospective Study	T8-ID60
T	Thompson, Roseann	Employing the WERC International Environmental Design Contest as a Part of a Capstone Course	M15-ID42
W	Ward, Bennett	Transcending the Silos: Leveraging Industry and Health Science Sponsored Capstone Projects to Foster a Real World Learning Experience across the School of Engineering	M7-ID37
	Watkins, Gregory	A Comprehensive Strategy for Recruiting Externally Funded Capstone Design Projects	M6-ID30

STUDENT POSTERS — Alphabetical by School

Student Poster ID's, MS# or TS#, correspond to the featured day (Mon. or Tues.) and location within in the poster area.

School	Title	Poster ID	Student Authors
Arizona State Univ.	Mayo Clinic TeleVision Project - ASU Polytechnic School eProject	MS11	Mobeen Ahmad, Jiawei Wu, Hytham Almuallem
Boston Univ.	Mooove Health Monitoring System for Cows	MS2	Ada Wong
Carnegie Mellon Univ.	A Sustainable Indicator for Solar Disinfection Water Purification	TS11	Abhinav Gautam
East Carolina Univ.	Afterglow: Perspectives of Capstone Alums	TS6	Abdulghani Jabr
Georgia Inst. of Tech.	Recovr: Your personalized solution to recovery	MS8	Sean Carroll
Georgia Inst. of Tech.	Capstone to Company	TS7	Ruwan Subasinghe
Hochschule Hannover	Video Information Program	TS2	Johannes Licht
North Carolina State Univ.	Howling Cow Dairy Farm Wireless Monitoring and Control	MS1	Brandon Lockee, Derek Whatley, Omran Alrowahi, Tyler Edwards
North Carolina State Univ.	Patagonia Fabric Durability Optimization	TS8	Trishna Patel, Dominique Koontz, Elizabeth Johnson, Patrick Balogh,
Rochester Inst. of Tech.	Multidisciplinary Senior Design Purchasing and Inventory Control System	TS5	William Darlington
SUNY New Paltz	Remote Drowning Detection System	TS3	Licelotte Fernandez, Nateena Ramnarine, Hilary Chan
The Ohio State Univ.	Patient Mitt for therapy after stroke	MS5	Lindsey Fox
The Ohio State Univ.	Helicopter isolette device for greater nurse safety	MS6	Adam Lehnig
Univ. of Alabama Hutsville	An Engineering Solution to Expand Dyslexia Awareness	MS9	Matthew Calahan
Univ. of Alberta	A Microwave Resonator Sensor for Air Gap Sensing	TS9	Dennis Ramsawak, Bertie Chen, Michael Amyotte
Univ. of Arizona	Nasogastric Tube Placement Verification System	MS4	Ivar Sanders
Univ. of Calgary	SDR À LA HAM: A Software Defined Radio Transceiver for use with a Mobile Phone	TS1	Alexander Sheldon, Akash Melethil, Bryce Besler, David Garrett, George Longpre, Timothy Saunders
Univ. of Colorado at Boulder	Radio Agnostic Phased Array	MS7	Matthew Arendall
Univ. of Dayton	Hinged Wrist Orthosis for Addressing Hand Spasticity	MS3	Kimberly Bigelow
Univ. of Oklahoma	Diffuser Compression Test Fixture	TS13	Zahed Siddique, Jacson Autrey, Farrokh Mistree
Univ. of Rhode Island	Taking Humanity Off the Endangered List	TS12	Harmony Smith
Univ. of Texas-Dallas	Design and Development of a Novel Gastrointestinal Injection Array Device	MS10	Tyler Markle
Univ. of Texas-Dallas	HydrΩMeter	TS10	Parul Mahajan
Univ. of Texas-Dallas	Smart Alarm Earplugs with Active Noise Cancellation	TS4	George Fleming
Univ. of Waterloo	Bloody Mathematics: Reducing distribution costs for Canadian Blood Services	MS12	Constance Gervais, Juliana Gonzalez, Brianna Horton, Danielle Shawcross, Hossein Abouee Mehrizi

POSTER LOCATIONS — Chemical and Biomolecular Engineering and Chemistry Building



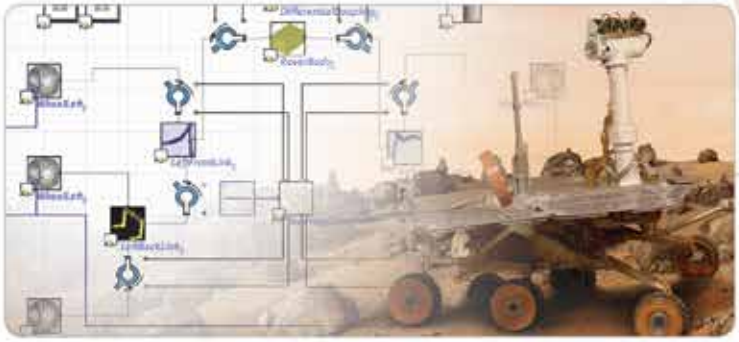
POSTER SESSION

NOTES/CONTACTS

NOTES/CONTACTS

From Months to Days

Do you want to develop complex multi-domain models quickly?

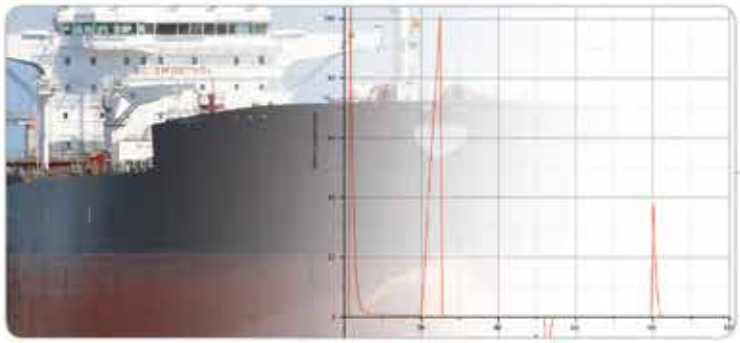


Planetary Rover
3 months to 10 days

A complex multidomain model that simulates planetary rover motion, wheel/soil interaction, energy consumption, and more.

Power-Split Hybrid Electric Vehicle
3 months to 15 days

A complex, multidomain model that covers all aspects of a hybrid electric vehicle, including a mean value internal combustion engine.



Vibration Analysis for Marine Driveline Systems
24 months to 20 days

A full model of the vibrational modes found in a marine driveline system.

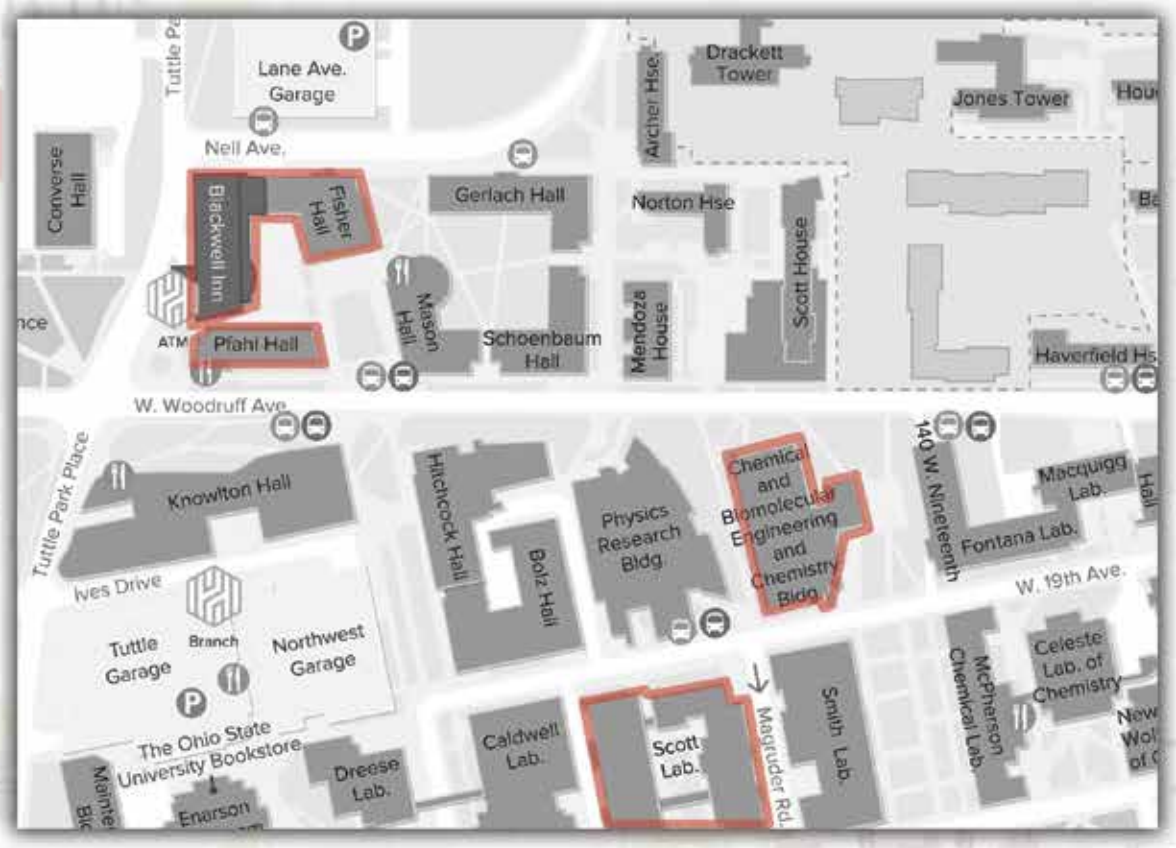
Request your complimentary Maplesoft Magazine: From Months to Days

www.maplesim.com/magazine

MapleSim™

Maplesoft
Mathematics • Modeling • Simulation

www.maplesoft.com | info@maplesoft.com



To view the entire campus map, visit www.osu.edu/map/pdf/map.pdf

CAMPUS MAP

2016 CAPSTONE SPONSORS

VENTUREWELL
20 years of idea to impact

ASEE
American Society for Engineering Education | Design in Engineering Education Division

ASTM INTERNATIONAL

KEEN
ENGINEERING UNLEASHED

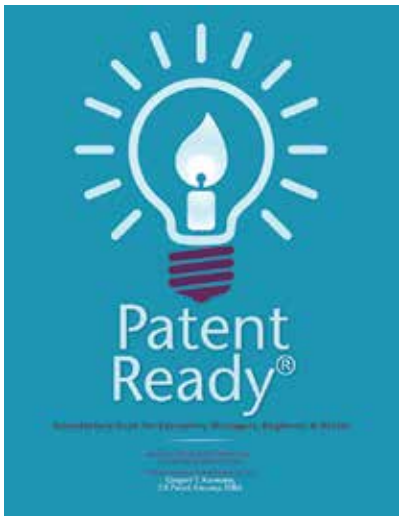
NATIONAL INSTRUMENTS

IEEE
STANDARDS UNIVERSITY
Innovation • Compatibility • Success

Maplesoft
Mathematics • Modeling • Simulation
A Cybernet Group Company

NCEES
advancing licensure for engineers and surveyors

Onshape



PMI
Project Management Institute

VERITY Design Learning