Wednesday, May 30, 2012

8:00 - 9:00 a.m. Registration Check-in/Continental Breakfast
9:00 - 10:30 a.m. Opening Session
10:30 - 11:00 a.m. Break
11:00 - 12:30 p.m. Panel Session 1
12:30 - 2:00 p.m. Keynote Lunch
2:00 - 3:30 p.m. Panel Session 2
3:30 - 4:00 p.m. Break
4:00 - 5:30 p.m. Poster Session 1
5:30 - 6:00 p.m. Break
6:00 - 7:30 p.m. Workshop Session 1 (with box dinner)
7:30 - 8:00 p.m. Dessert Break
8:00 - 9:30 p.m. Workshop Session 2

Thursday, May 31, 2012

6:30 - 7:30 a.m. Run/Walk
8:00 - 9:00 a.m. Registration Check-in/Continental Breakfast
9:00 - 12:30 p.m. Local Tours and Activities
12:30 - 2:00 p.m. Birds of a Feather Lunch
2:00 - 3:30 p.m. Panel Session 3
3:30 - 4:00 p.m. Break
4:00 - 5:30 p.m. Poster Session 2
5:30 - 6:00 p.m. Break
6:00 - 7:30 p.m. Workshop Session 3 (with box dinner)
7:30 - 8:00 p.m. Dessert Break
8:00 - 9:30 p.m. Workshop Session 4

Friday, June 1, 2012

8:00 - 9:00 a.m. Registration Check-in/Continental Breakfast
9:00 - 10:30 a.m. Panel Session 4
10:30 - 11:00 a.m. Break
11:00 - 12:30 p.m. Panel Session 5
12:30 - 2:00 p.m. Closing Lunch and Next Steps
On behalf of the entire Capstone Design Conference Organizing Committee we welcome you to Champaign-Urbana for the 2012 Capstone Design Conference.

We are delighted to continue the success of the 2007 and 2010 conferences and to keep building a community of educators, students, and industry to discuss, analyze, and improve capstone design education. Per interest of past conference attendees, the theme for the 2012 Capstone Design Conference is Industry Involvement in Capstone Design.

The 2012 conference is intentionally designed to promote discussion and interaction across the capstone community. We solicited submissions through two primary tracks: papers and industry-academia collaboration posters. Rather than the traditional oral paper presentation format, the conference instead features two conference-wide poster sessions (including faculty, industry affiliates, and students) to encourage vibrant and extensive sharing of ideas and experiences. Based on themes that emerged from the accepted papers and posters, we invited panel participants to discuss topics related to the conference theme. In addition, we accepted a range of workshops to enable attendees to learn new skills and strategies.

The 2012 conference continues the tradition of student involvement, reflecting students’ key role in capstone design. Look for featured capstone student projects in the poster session as well as invited student participation in some of the panel sessions. We are grateful to the contributions of our many conference sponsors, exhibitors, and advertisers who support the student involvement and help us keep the conference fees low.

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 2012 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!

- Susannah Howe and Peter Rogers, co-chairs

Welcome from the co-Chairs

WiFi Access:
Connect to IHCC Guest then open an Internet browser and accept the terms

Organizing Committee

Susannah Howe
Smith College
co-chair

Peter Rogers
Ohio State University
co-chair

Patsy Brackin
Rose-Hulman Institute of Technology
panels

Steve Beyerlein
University of Idaho
workshops

Jay Goldberg
Marquette University
industry involvement

Junichi Kanai
Rensselaer Polytechnic Institute
paper management

Glen Livesay
Rose-Hulman Institute of Technology
special sessions

Kevin Nickels
Trinity University
posters

Judith Norback
Georgia Institute of Technology
student involvement

Scott Palo
University of Colorado
webmaster

Linda Riley
Roger Williams University
communications

Keith Stanfill
University of Florida
fundraising

Steve Zahos
University of Illinois
local organizing
We must learn to use energy more efficiently. For 25 years, the Shell Eco-marathon® has supported teams worldwide who explore ways to maximize fuel economy. Last year’s winner was capable of traveling 8,870 miles on the equivalent of one gallon of fuel. This spirit epitomizes our relationship with car manufacturers, finding ways to make cars more efficient. And it’s typical of our ambition to help build a better energy future.

www.shell.us/letsgo

Let’s Go Further on One Gallon of Fuel.

Let’s Go.
2:00 - 3:30 p.m. Panel Session 2

Session 2A: The Value of Capstone Design to Industry
Patsy Brackin, Rose-Hulman Institute of Technology, (Facilitator)
Larry Jutte, President and COO, Ernie Green Industries
Jim Trent, Brigham Young University, formerly with Wolf Electronix
Matthew Walker, Vanderbilt University, formerly with Merck
Stephanie Hur, AbilityOne Design Challenge, NISH

Representatives with significant industry experience will discuss industry’s perspective on the value of capstone design projects.

Session 2B: Multidisciplinary Capstone Design
Thomas Barber, University of Connecticut, (Facilitator)
Scott Dixon, Caterpillar Inc.
Craig Forest, Georgia Institute of Technology
Jay Goldberg, Marquette University
Peter Rogers, The Ohio State University

The engineer of the future must be able to work on multidisciplinary teams, but implementing multidisciplinary capstone design projects can be a challenge. Come and discuss the potential and the problems.

Session 2C: What I Wished I Had Learned in Capstone Design: An Industry Perspective
Andrew Watchorn, National Instruments, (Facilitator)
Glenn Pope, John Deere
Shekhar Sharad, National Instruments
Susan Shuff, Caterpillar
Representative, Cummins
Representative, NI Alliance Partner

Industry panelists will share what they wish they had learned in capstone design and how that would have helped them in their careers.
Workshop Session 2

8:00 - 9:30 p.m.

Workshop 2A: Capstone 101 - Best Practices For Capstone Course Administration – repeat of 1A

Workshop 2B: Safety and Reliability In Capstone – repeat of 1B

Workshop 2C: It's All About Relationships: Understanding Their Development Inside a Capstone Clinic
Chuck Pezeshki, Washington State University

This workshop examines the memetic Spiral Dynamics model of human relationships along with its implications for capstone project selection/scoping, client training/debriefing, student-client interactions, student management of 'group knowledge', and external facilitation needed for optimal design achievement as well as professional growth. Over the course of the workshop, participants will have an opportunity to explore, discuss, and assess a variety of project management tools grounded in the principles of Spiral Dynamics. Dr. Pezeshki serves as director of the Industrial Design clinic in the School of Mechanical and Materials Engineering where he has supervised over 190 different student projects made possible by a committed team of clients and nearly $2M in industry funding.

6:30 - 7:30 a.m.

Run/Walk – Meet in I Hotel Lobby
Prepare for day two of the conference with an exhilarating run (4 mile) or walk (2 mile) through the beautiful and historic campus of the University of Illinois. The tour guide has promised to focus on the amazing architecture and history of the UI, as you see important buildings related to most of the academic programs offered, including the engineering quad.

8:00 - 9:00 a.m.

Registration Check-in/ Continental Breakfast – Chancellor Ballroom Lobby

8:30 - 12:30 p.m.

Local Tours and Activities

8:30 - 12:30 p.m.
Caterpillar Plant Tour, Decatur, IL – Meet at Conference Center North Door (facing Assembly Hall)
The Caterpillar factory in Decatur manufactures advanced road scrapers, graders and the largest mining trucks in the world! Board the bus at 8:30 AM and be prepared to witness one of the most impressive manufacturing operations imaginable. Illinois is home to Caterpillar, the world's largest producer of bulldozers, excavators, and wheel loaders. The company has experienced 21 straight three-month periods of growth. Cost is $15; advanced registration is required. Limited to 45 people.
www.cat.com

8:30 - 9:45 a.m.
Blue Waters National Supercomputer – Meet in I Hotel Lobby
Within a short walk from the conference center this is a guided tour of the National Supercomputer. The Blue Waters project will deliver a supercomputer capable of sustained performance of 1 petaflop on a range of real-world science and engineering applications. It is expected to be one of the most powerful supercomputers in the world. See also the outcome of a cooling system optimization capstone design project conducted by the University of Illinois Department of Mechanical Science and Engineering. No charge; sign up at the registration table. Limited to 50 people.
www.ncsa.illinois.edu/BlueWaters/

9:45 - 11:15 a.m.
Spurlock Museum – Meet at Conference Registration Desk
The Spurlock Museum's five feature galleries house exhibits representing peoples of the following cultures and geographic areas of the world: Ancient Mesopotamia, Ancient Egypt, and Africa; Ancient Greece and Rome; East Asia, Southeast Asia, and Oceania; Europe; and American Indian Cultures of North and South America. Board a shuttle at 9:45 AM for a guided tour scheduled from 10:00- 11:00 AM. No charge; sign up at the registration table. Limited to 25 people.
Note, the museum is within walking distance of the conference center (600 S. Gregory St, Urbana) if you want to visit at another time.
www.spurlock.uiuc.edu

9:45 - 11:30 a.m.
Research Park Tour – Meet in I Hotel Lobby
Just a short walk from the conference center, enjoy an introduction to the Illinois Research Park in the Incubator and then visit three tenants of the park who have experience with capstone students and projects. Tenants include Autonomic Materials, Inc (www.autonomicmaterials.com), State Farm (www.statefarm.com), and John Deere (www.deere.com).
No charge; sign up at the registration table. Limited to 25 people.
www.researchpark.illinois.edu

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WEDNESDAY, MAY 30

THURSDAY, MAY 31

8:00 - 9:30 p.m.

Alma Mater
Quad

11

GET FUNDED
NCIIA awards $1.5 million annually to faculty and student innovators, and offers competitions with cash prizes for biomedical engineering students.
nckiia.org/grants

GAIN SKILLS AND GROW YOUR VENTURE
NCIIA provides professional development workshops to faculty and business strategy training to student innovators and NCIIA grantees.
nckiia.org/ventures

GET CONNECTED
NCIIA creates opportunities to meet and collaborate with peers and colleagues from around the US and the world.
nckiia.org/network

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Local Tours and Activities (continued)

Self-scheduled
Krannert Art Museum
Located on the campus of the University of Illinois at Urbana-Champaign and housed within the College of Fine and Applied Arts, the Krannert Art Museum opened its doors in 1961, establishing a permanent home for the University’s existing collection of fine art. Featured exhibits include Walking in Paris (19th Century) and Expressions in Color (20th Century). This museum is about a half mile from the conference center (500 East Peabody Drive, Champaign) and also has ample adjacent parking. Hours are 9 AM - 5 PM. No admission charge. www.kam.uiuc.edu

Self-scheduled
Abraham Lincoln Presidential Library and Museum
This slice of history is located just 78 miles from Champaign in Springfield IL and would make an excellent activity for families and guests. Opened just a few years ago, the museum offers a self-guided tour through the life and work of the 16th President. Nearby are the house he lived in while raising a family and practicing law, as well as his gravesite. www.alplm.org

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

Through our two 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 2012 conference attendees into this friendly and talented community.

As an outcome of our 2010 conference, we published an extensive set of peer-reviewed articles about capstone pedagogy in a special issue of the International Journal of Engineering Education (IJE, vol. 27-6). We also formed the current conference organizing committee and a working group that is creating a Capstone Hub for sharing instructional, administrative, and mentoring materials. There will be a special workshop session on Thursday evening to hear more about the Capstone Hub.

As an outcome from this 2012 conference, we intend to publish another special issue of IJE and gather input from a wider array of Capstone Hub stakeholders, leading to exciting collaborative activities that will continue between the conclusion of this conference and the next Capstone Design Conference in 2014. We invite you to join us in our quest for shared excellence in capstone design education.

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

2:00 - 3:30 p.m.
Panel Session 3

Quad
Session 3A: The Art and Science of Problem Definition
Gene Dixon, East Carolina University, (Facilitator)
Darrell Gibson, Rose-Hulman Institute of Technology
Peter Gorder, University of Colorado at Colorado Springs
Warren Seider, University of Pennsylvania

How do you formulate a problem for capstone design teams? How do you turn a company need into a realistic project scope for engineering students?

Alma Mater
Session 3B: Strategies for Attracting Industry Projects
Jerry Crain, University of Oklahoma, (Facilitator)
Joel Barnett, Vanderbilt University
Andrew Dozier, University of Louisville
Emad Jassim, University of Illinois
Paul Jones, Corporate & University Relations Group

How do you partner with industry? How do you find good projects? How do you find good company contacts?

Lincoln
Session 3C: Assessing Capstone Design
Denny Davis, Washington State University, (Facilitator)
John Ochs, Lehigh University
Leslie Potter, Iowa State University
Charlie Setterfield, Sinclair Community College
Scott Post, Bradley University

Students acquire significant knowledge and experience in capstone design. How can we assess this learning? Can we use these assessments for program assessment?

3:30 - 4:00 p.m.
Break

4:00 - 5:30 p.m.
Poster Session 2 – Chancellor Ballroom

5:30 - 6:00 p.m.
Break
Workshop Session 3 (with box dinner)

Workshop 3A: A Professional Practice Model For Capstone Design Courses
Robert Joel Barnett, Vanderbilt University

This workshop describes the operation of a Professional-Practice Model for Senior Capstone Design Courses which eliminates many of the shortcomings associated with the traditional academic course structure when applied to an realistic design experience. The workshop will describe the sequence of events necessary to implement the model, from initial corporate contact to final project presentation. Examples will be given of documentation, policies and practices, terminology, and other practical aspects of the model. Discussion will be solicited concerning alternate methods or additions/modifications to the Professional-Practice Model. The facilitator has had extensive industrial and academic experience and has taught/supervised Senior Capstone design courses for 15 years and has supervised over 150 projects.

Workshop 3B: Assessing Awareness Of Professional Responsibility In Engineering Projects
Denny Davis, Washington State University
Steven Beyerlein, University of Idaho
Patricia Brackin, Rose-Hulman Institute of Technology

This workshop presents a web-based professional responsibility instrument and accompanying rubric, which are used to assess student understanding and skill at identifying and discussing areas of strength and opportunity in an ethical case taken from an ongoing capstone project. The session will alternate between short presentations, exploration of website materials, opportunity to score and discuss samples of student work, and learning how class-wide ABET reports can be derived from this data. The facilitators are part of a national research consortium that has developed assessment instruments and supporting curricula as part of the Integrated Design Engineering Assessment and Learning System (IDEALS).

Workshop 3C: What Do You Need From Technology For Capstone Design?
Todd Akins, Mathworks

This workshop will (1) present the latest features of MATLAB and Simulink to support capstone design including microcontroller targeting/testing, robot and mechanism design, and FPGA/ASIC design, and (2) provide examples of how universities are using these features. Attendees will learn how these features can be used in capstone design and will have the opportunity to provide feed back regarding new features that would benefit capstone design courses.

7:30 - 8:00 p.m.  Dessert Break – Chancellor Ballroom Lobby

Workshop Session 4

Workshop 4A: Capstone Design Hub: Building an Online Resource Center for the Capstone Community
Steve Blair, University of Utah
Susannah Howe, Smith College
Peter Rogers, Ohio State University
Junichi Kanai, Rensselaer Polytechnic Institute
Keith Stanfill, University of Florida
Glen Livesay, Rose-Hulman Institute of Technology

The goal of this workshop is to preview the beta version of the new Capstone Design Hub (CDHub) and get feedback from the capstone community to improve the value and usability of the CDHub. The facilitators will discuss the origin of the CDHub idea and review the current content/layout of the site. Participants will have the opportunity to test out the site and will be encouraged to provide input on current content and guidance for future directions.

Workshop 4B: Assessing Awareness Of Professional Responsibility In Engineering Projects – repeat of 3B

Workshop 4C: What Do You Need From Technology For Capstone Design?
Advance your knowledge of the earth, the environment, the universe.
MATLAB lets you test ideas in a wide range of engineering, science, and mathematics disciplines.

what will you do with MATLAB?

MATLAB and Simulink are fundamental computational tools used at educational institutions worldwide. More than 5000 universities and colleges use these tools to accelerate learning, teaching, and research and to prepare students for careers in industry, where MATLAB and Simulink are widely used for collaborative new product development.

mathworks.com/academia

FRIDAY, JUNE 1
8:00 - 9:00 a.m.
Registration Check-in/ Continental Breakfast – Chancellor Ballroom Lobby

Panel Session 4

Session 4A: The Importance of Technical Standards:
An Industry Perspective
Howard Wolfman, Lumispec Consulting,
Adjunct Professor University of Illinois, (Facilitator)
Bruce Harding, Purdue University (ANSI committee member)
Laura Hitchcock, The Boeing Company, Industry representative
Amin Karim, DeVry University
Robert Noth, former President ANSI Board of Directors, John Deere
Jim Olshesky, ASTM International

This is an interactive session addressing the importance of including technical standards education in engineering curricula and the needs of industry. This panel session is sponsored by the IEEE Standards Education Committee (SEC), a joint standing committee of the IEEE Educational Activities Board and the IEEE Standards Association, and ASTM International.

Session 4B: Best Practices for Industry Sponsored Projects
Bahram Nassersharif, University of Rhode Island, (Facilitator)
Jennifer Amos, University of Illinois
Promit Bagchi, Dresser Rand
Darrell Kleinke, University of Detroit Mercy

Many programs have long established partnerships with industry. Best practices will be shared from a variety of institutions.

Session 4C: Required Resources for Capstone
Glen Livesay, Rose-Hulman Institute of Technology, (Facilitator)
John Blamer, Dresser Rand
Deborah O’Bannon, University of Missouri, Kansas City
Louis Reifschneider, Illinois State University
Gregory Watkins, California State University Chico

The resources allocated for capstone design vary widely between institutions and within majors. What is needed for a successful program?

12:30 - 2:00 p.m.
Closing Lunch and Next Steps – Chancellor Ballroom
Industry Academy Collaboration Posters

List of posters, alphabetically by first author

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<td>F2 Requirements Analysis: Case study with Capstone Design Project</td>
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<td>Sheryl Johnson, Lehigh University; Lisa Getzler-Linn, Lehigh University</td>
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<td>Michael Groff, Clemson University; Darren Dawson, Clemson University</td>
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<td>C10 Conflicting Mindsets: Industry Sponsors and Capstone Instructors Working Together</td>
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<td>Scott Delmotte, University of Detroit Mercy</td>
<td>B13 A Gated Review Process for Administering a Capstone Senior Design Course at Western Michigan University</td>
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<td>Peter Kenny, University of Colorado Colorado Springs</td>
<td>A17 Helpful Guidelines in Working with Industry Sponsors</td>
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<td>B14 Using Graduate Assistants as Project Advisers for Industry-Sponsored Capstone Design Projects</td>
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<td>Maria Dolores Blas, Universitat Autonoma de Barcelona; Adriana Lloret, Universitat Politècnica de Catalunya; Marco Pau, Universitat Politècnica de Catalunya; Patrick Ostermeyer, Universitat Politècnica de Catalunya</td>
<td>C15 Structured Approach to Problem Specification in Industry Sponsored Capstone Design</td>
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<td>Brian J. Jacobson, Portland State University; Anand Rao, Portland State University; Andrew Brightman, Portland State University; Anna Linn, Kinetic Concepts, Inc.; Marca Post, Portland University; Trevi Donato, Portland University</td>
<td>B1 Teaching Industry Principles of Practice from Real Identification to Market Assessment</td>
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<td>Robert McNicol, U.S. Military Academy; Bruce Florham, U.S. Military Academy; Kevin#regionhead; Richard Green, Computing Institute, Inc.; Adam Beiler, Computing Institute, Inc.; Matthew Molina, SpringAction, Inc.; Jason Kolodziej, Rochester Institute of Technology</td>
<td>D9 The Benefits of Involving Industry in Engineering Capstone Courses: A Case Study</td>
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Regular Papers

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Exhibits will be in the Chancellor Ballroom:

Wednesday 10:30 a.m. - 6:00 p.m.
Thursday 9:00 a.m. - 6:00 p.m.

AbilityOne Design Challenge

The AbilityOne Network Design Challenge was founded by NISH to encourage the development of creative technological solutions for barriers that prevent people with disabilities from entering or advancing in the workplace. The Design Challenge is open to any college student or student team at the graduate or undergraduate level and is a great service learning opportunity for engineering, computer science, industrial engineering, physical therapy and occupational therapy students!

American Society for Engineering Education – Design in Engineering Education Division (DEED)

The purpose of DEED is to address the design education issues of virtually every engineering discipline. To this end, the division sponsors programs and other activities that address the particular problems and needs of engineering design education. The DEED membership is informed about the activities of the division, and new developments in engineering education design through the DEED Bulletin.

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(continued)
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We support technology innovation and entrepreneurship in universities and colleges to create experiential learning opportunities for students, and successful, socially beneficial businesses. With a membership of nearly 200 colleges and universities from all over the United States, the NCIIA engages more than 5,000 student and faculty innovators and entrepreneurs each year, helping them to bring their concepts to commercialization. The NCIIA ‘pipeline’ provides nascent student start-ups with early stage funding, business strategy development training, mentoring, and investment.

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Shell Eco-marathon challenges student teams from around the world to design, build and test ultra energy-efficient vehicles. With annual events first in the Americas, then Europe and Asia, the winners are the teams that go the furthest using the least amount of energy. The events spark debate about the future of mobility and inspire young engineers to push the boundaries of fuel efficiency.

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