



PROGRAM

4<sup>TH</sup> ANNUAL

# E4 CONFERENCE { EXCELLENCE in ELEMENTARY ENGINEERING EDUCATION }

NOVEMBER 7<sup>TH</sup>, 2011



at the Continuing Education and Conference Center  
1890 Buford Avenue, Saint Paul, Minnesota

*This conference was produced by The Works with generous support from the 3M Foundation and the Minnesota Department of Education with guidance from the E4 Council*

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## SCHEDULE

CHECK IN ----- 7:30 to 8

WELCOME & KEYNOTE ----- 8 to 9:15

SESSION 1 ----- 9:30 to 10:45

LUNCH----- 11 to 1

SESSION 2A ----- 11 to 12

SESSION 2B ----- 12 to 1

SESSION 3 ----- 1:15 to 2:30

SESSION 4 ----- 2:45 to 4

## WELCOME & KEYNOTE 8 to 9:15 AM

### WELCOME

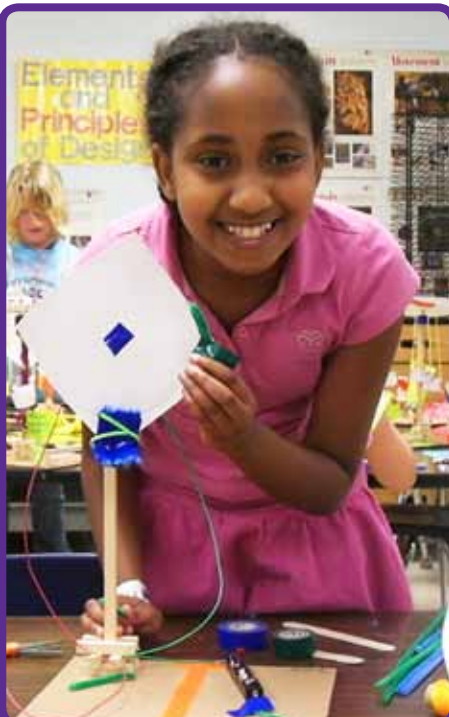
Rebecca Schatz  
President & Founder, The Works

### THANK YOU

Jill Measells  
Chief Executive Officer, The Works

### RE-ENGINEERING THE CURRICULUM

Ioannis Miaoulis  
Director, Museum of Science, Boston



the  
**Works**

9740 GRAND AVE S.  
BLOOMINGTON, MN 55420  
952-888-4262  
www.theworks.org

## EXHIBITORS

### ALL DAY - 8 AM - 4 PM

Explore information and activities from local nonprofits, plus exhibitors relevant to elementary engineering.

Bakken Museum  
[www.thebakken.org](http://www.thebakken.org)

Center for Pre-Collegiate  
Engineering Education,  
University of St. Thomas  
[www.stthomas.edu/engineering/outreach/curricula](http://www.stthomas.edu/engineering/outreach/curricula)

Kidwind  
[www.kidwind.org](http://www.kidwind.org)

LEGO Education  
[www.legoeducation.us](http://www.legoeducation.us)

Science House  
at Science Museum of Minnesota  
[www.smm.org/sciencehouse](http://www.smm.org/sciencehouse)

STEM Education Center,  
University of Minnesota  
[www.cehd.umn.edu/STEM](http://www.cehd.umn.edu/STEM)

The Works  
[www.theworks.org](http://www.theworks.org)



## SESSION 1 - 9:30 to 10:45 AM

### SPORTS + ENGINEERING = FABULOUS FUN

Adine A. Thoreen & Lisa Regalla  
TWIN CITIES PUBLIC TELEVISION

ROOM 155

Build a super bouncy balloon ball! Teams will compete for the most bouncy balloon; hear about SciGirls, the Emmy-award-winning national PBS series. Take home a SciGirls Engineer It activity book & tips to engage more girls in the E of STEM. Activities and tips are good for mixed gender classrooms.

### PICTURE BOOKS & ENGINEERING: THE PERFECT FIT FOR STEM INTEGRATION

Tamara Moore & Kristina Tank  
UNIVERSITY OF MINNESOTA

ROOM 42A

This hands-on session will introduce curricular units that use picture books to motivate an engineering design project and integrate mathematics and science content. Attendees will participate in a mini-version of one of the modules and will learn about implementation strategies.

### SCAFFOLDING ENGINEERING

Yvonne Ng  
SAINT CATHERINE UNIVERSITY

ROOM 166

Engineering projects can scaffold engineering development as well as satisfy K-3 science standards. This session includes a hands-on activity, discussion of supporting learning activities, and how well-designed projects can be used for assessment and aligns with the standards.

### PINBALL CIRCUITRY

Robby Callahan Schrieber

ROOM 32

Learn how a cohort of recent high school graduates has been teaching 4th & 5th graders electrical engineering and design skills to create their own pinball game.

### SOUND & LIGHT

Martha Hotchkiss & Sonia Krech-Jacobsen  
THE WORKS

ROOM 62

Looking for a way to fulfill science standards in sound and light? Discover the engineering design process and enjoy lots of hands-on projects that include a vibrating sound sandwich, an ear harp, a kaleidoscope, plus other sound and light activities.

### NEXT STEPS: RAMP UP YOUR ENGINEERING WITH MATHEMATICS

Ann Bernard & Cathy Kindem  
CEDAR PARK STEM ELEMENTARY, APPLE VALLEY

ROOM 42B

You have been teaching engineering projects for a while now and they are not half bad...BUT you know there is more out there. In this session, learn ways to step up your engineering instruction by making purposeful connections to mathematical content and standards.

### FROGS, VOLTS, & VINEGAR

Steve Walvig, Anika Taylor, & Nate Meyer  
BAKKEN MUSEUM

ROOM 83

Explore basic circuits while you build your own switch and flashlight, then learn about the invention process and keeping an invention journal.

### AEROSPACE ENGINEERING

James Flaten  
UNIVERSITY OF MINNESOTA

ROOM 156

Jill Wall  
FARNSWORTH AEROSPACE PK-8 MAGNET SCHOOL

Roll up your sleeves and launch gliders, build parachutes, play with rockets and more with experienced teachers and aerospace experts.

## LUNCH + SESSIONS 2A & 2B

Attend one of the 2A sessions listed below from 11 to 12, then eat lunch and explore exhibitors from 12 to 1 OR eat lunch and explore exhibitors from 11 to 12, then attend one of the 2B sessions (next page) from 12 to 1. The buffet lunch upstairs is included in your conference registration fee.

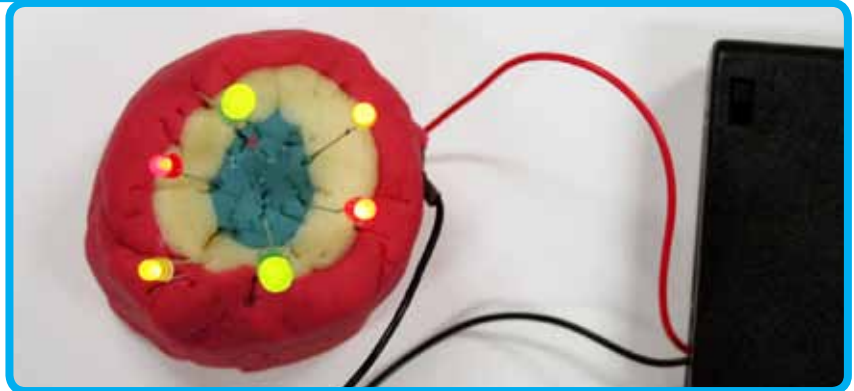
### SESSION 2A - 11 AM - 12 PM

#### SQUISHY CIRCUITS

AnneMarie Thomas  
UNIVERSITY OF SAINT THOMAS

ROOM 135AC

Bring your sculpted creations to life using lights, motors, and conductive and non-conductive playdough.



#### TELLING DIGITAL SCIENCE STORIES

Lisa Koch & Laurie Toll  
WEAVER LAKE ELEMENTARY, OSSEO

ROOM 155

This session will inspire educators to create a 21st century learning environment by challenging students to publish science and engineering content for a global audience, motivating students to become better scientists and writers and see themselves as contributors to a larger community.

#### USING ONLINE RESOURCES FOR ELEMENTARY ENGINEERING

Nancy Meyer  
BURNSVILLE

ROOM 166

How can you use online resources to enhance the engineering activities in your classroom? Come and find out. I will feature resources for teachers as well as games/activities/resources for students and parents.



#### GEODESIC DOMES

Amanda Porter, Anita Hall,  
Cassandra Svendsen & Lesley Wyckoff  
SOCIETY OF WOMEN ENGINEERS

ROOM 135BD

What can you do with rolled up newspaper and LOTS of tape? Learn how to teach 4-6th graders about structural elements, compression and tension through the building of an actual Geodesic Dome. This inexpensive and fun activity yields a real dome that a dozen kids can sit inside of. We will also conduct strength tests and finally destruction tests.

#### NASA'S SUMMER OF INNOVATION

James Flaten  
UNIVERSITY OF MINNESOTA

ROOM 156

Jill Wall  
FARNSWORTH AEROSPACE PK-8 MAGNET SCHOOL

In this session we will introduce the Summer of Innovation (SOI) project that uses NASA's unique resources and exciting missions to engage students in grades 4 to 9 in a wide array of NASA-related STEM activities. SOI grant funding has been aimed at groups offering programming for this age group especially during summer months. However part of the SOI project involves generating an on-line set of curricular activities for use by teachers in any convenient context. In this session we will explore those on-line resources and try some of NASA's best curricular activities for upper elementary / middle school students.



## SESSION 2B - 12 PM - 1 PM

### EXPLORING RENEWABLE ENERGY WITH LEGO

Peter Hoh  
SCIENCE MUSEUM OF MINNESOTA

ROOM 42B

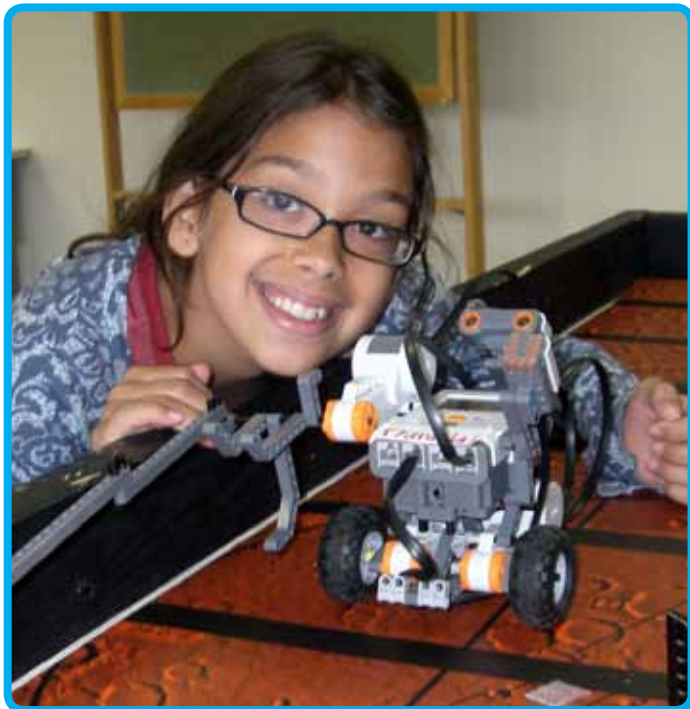
Experience the engineering design cycle as you build a hand-cranked generator using the LEGO Renewable Energy set. Learn how your students can use the same set to design, build, and test mechanisms that turn solar, wind, and water power into electrical energy that can be measured and stored.

### GROUPWORK STRATEGIES IN THE ENGINEERING CLASSROOM

Nils Halker  
SCIENCE MUSEUM OF MINNESOTA

ROOM 62

We all know the potential power of using groupwork in engineering classrooms, but it can go awry. This session addresses effective tools for groupwork in classrooms. We will explore the roles of both students and teachers, delegation of authority to students, and procedural roles.



### TOY ENGINEER'S WORKSHOP

Jane Copes  
SCIENCE OUTSIDE THE BOX

ROOM 32

We will design, build, and test simple toys that have delighted children for decades. You can examine several other toy projects and take home ideas to sneak in the science, mix in some math, and encourage the engineering.

### WEDO WITH K-2 STUDENTS

Mark Mueller  
SAINT PAUL SCHOOL DISTRICT

ROOM 42A

Connect with kids and guide them through the discovery of lego engineering. We will use WEDO Lego components to build a simple alert system. Learning to link program code to action using a sensor, a loop, and sound.

### A STEM JOURNEY

Deb Belfy, Cristin Caruso, Kim Kellum,  
Ryan Watt, & Cathy Eiss  
BLOOMINGTON SCHOOL DISTRICT

ROOM 52

Teachers from Poplar Bridge Elementary will share their STEM journey. How can you increase the STEM focus at your school without access to federal grant money? Topics to be discussed will be staff development, STEM integration, fundraising, and resources to explore.





## SESSION 3 - 1:15 to 2:30 PM

### USING ENGINEERING TO DEVELOP MATHEMATICAL THINKING

Roger Skophammer  
VALLEY CITY STATE UNIVERSITY

ROOM 156

How Can I Use Mathematics to Solve This Problem? The design challenges in elementary engineering activities provide a great opportunity to develop mathematical thinking. We will review some mathematics intensive activities and do a design challenge that will get participants to think mathematically.

### ENGINEERING IS ELEMENTARY® (EiE) ROUNDTABLE

Maija Sedzielarz & Kathryn Guimond  
SCIENCE MUSEUM OF MINNESOTA

ROOM 62

Have you taught Engineering is Elementary® units and would like to talk with others who have taught the same unit? Are you interested in implementing EiE and want to hear more about others' experiences? Join us to share your questions, tips and insights around the EiE curriculum and units.

### COASTING THROUGH FORCES & MOTION

Dr. Patricia Paulson,  
Professor of Science Education  
Professor Daniel Swenson  
Associate Professor of Education  
Seth Reimen & Laura Fosse  
Science Education Majors  
BETHEL UNIVERSITY

ROOM 135BD

Forces and motion come together with engineering design as we explore kinetic and potential energy, friction, gravity and inertia in this hands-on activity. Join us as we create roller coasters made from pipe insulation and marbles.

### ENGINEERING IN NATURE

Britt Forsberg & Erin Rupp  
BELL MUSEUM OF NATURAL HISTORY

ROOM 32

In this workshop, participants will take part in engineering challenges to bring back to their classrooms. We will solve engineering problems found in nature, observe how plants and animals respond to these pressures, and see how humans use nature's ingenuity in our own designs.

### LINKING STEM EDUCATION FROM SCHOOL TO HOME

Jennifer Parker & Michelle Haigh  
PILOT KNOB STEM ELEMENTARY

ROOM 52

STEM is a big buzz acronym in education these days, but families do not always know what it is, or how to support their child. Learn how to implement a successful school-home connection to get kids and parents talking and learning about STEM concepts together.

### ENGINEERING ENHANCING PRIMARY FOSS UNITS

Christy Nelson, Peggy Demmert  
& Katie Schoenbauer  
CEDAR PARK ELEMENTARY, APPLE VALLEY

ROOM 42A

Join us as we share how engineering has enhanced our primary Foss units. We will show you how integrated engineering can be in your current curriculum and reflective of current state science standards. No need to make it harder than it has to be!

### A PLACE FOR ART & DESIGN EDUCATION IN THE STEM CONVERSATION

James Bequette  
UNIVERSITY OF MINNESOTA  
Marjorie Bullit Bequette  
SCIENCE MUSEUM OF MINNESOTA

ROOM 135AC

There is a clear overlap between the design processes as taught in art classrooms and in engineering classrooms. In our interactive session, we describe the possibilities of an approach that infuses both the creative process and design thinking into a new iteration of STEM education that adds arts (with a capital "A") to the acronym to make STEAM.





## SESSION 4 - 2:45 to 4:00 PM

### SCRATCH

Kent Sall  
MUSEUM MAGNET SCHOOL

Keith Braafladt  
SCIENCE MUSEUM OF MINNESOTA

In this session we will explore Scratch, a free program from MIT, that makes it easy for students to create and share interactive stories, animations, music and games. We will see some simple and intermediate projects and learn ways to quickly incorporate Scratch into your classroom. Resources for project ideas, lesson plans, and further learning opportunities will be shared. Bring your own flashdrive or laptop and copy the resources for your own use.

ROOM 220, LEARNING AND ENVIRONMENTAL SCIENCES BUILDING



### CREATIVE ENGINEERING

Cheryl Moeller & Tim Barrett  
STEM AHEAD

ROOM 135AC

The engineering process requires resourceful application and creative-thinking. The presenters will demonstrate how to creatively reinforce the engineering process and these creative skills with students. Participants will engage in creative games and activities designed to focus on individual aspects of the engineering process and the skills involved in successful problem-solving and design work.

### FRAMEWORKS FOR MATH & SCIENCE TO SUPPORT ENGINEERING

Doug Paulson, John Olson  
& Sue Wygant  
MINNESOTA DEPARTMENT OF EDUCATION

ROOM 135BD

Do you need help turning standards into instruction and learning? This session will look at the development, organization and use of online resources created by Minnesota teachers to provide support for standards-based instruction. The newly released Frameworks are organized by Minnesota standards and include: explanations of the benchmarks, resources and links, assessment items, and vignettes of classroom instruction. Included in this are many opportunities to develop thinking around engineering.

### WHAT IS ENGINEERING?

Candace Slattery & Martha Hotchkiss  
THE WORKS

ROOM 62

This workshop will explain what engineering is, introduce you to the engineering requirements in the MN science standards and give you the hands-on experience and confidence to do exciting engineering design challenges with your students. Includes trying out an engineering challenge for yourself with our Pasta Bridge challenge. How many scoops of sand will your bridge hold before it breaks?

### TECH TAKE-APART

Richard Pollard  
THE WORKS

ROOM 83

John Bushey  
RILEY LAKE ENGINEERING, INC.

See how an electrical and a mechanical engineer look at machines, then dive in and take apart VCRs, computer peripherals and other gizmos. Learn how to do this activity in your K-6 classroom.

### WIND ENERGY

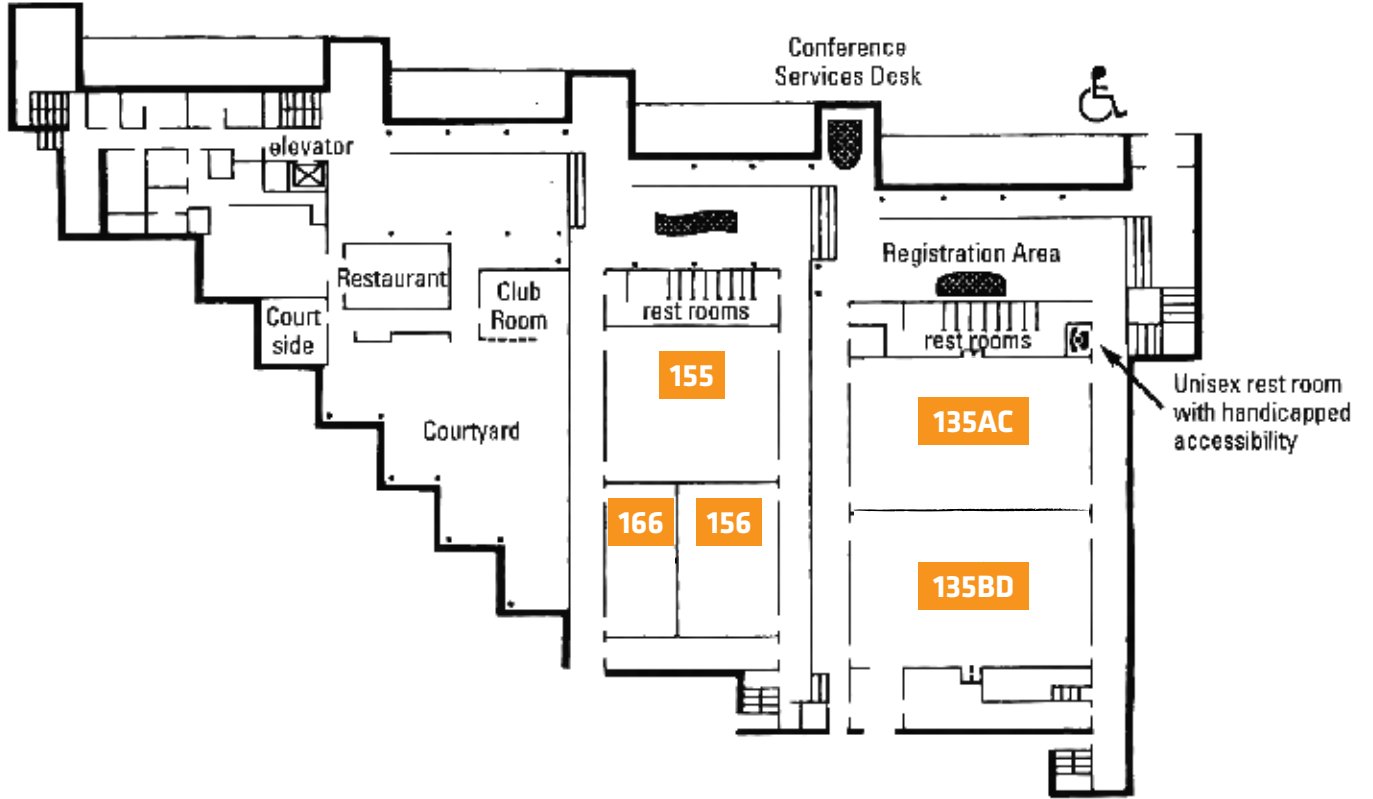
Joe Rand  
KIDWIND

ROOM 32

Tap into expertise and kits from KidWind to explore sustainable energy and hands-on projects on wind power and turbine design.

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CONTINUING EDUCATION & CONFERENCE CENTER, ST. PAUL

UPPER LEVEL



LOWER LEVEL

