# ION Saint Louis

**IEEE ST. LOUIS SECTION**

**FALL 2014**

**IEEE**

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# Callaway Tour

15 IEEE St. Louis section members visited the Callaway Nuclear Power Plant on Aug 28, 2014.  The IEEE team included both student and professional members from the St. Louis area. The visitors were given a guided tour of the nuclear plant and its functioning.  The Callaway Nuclear Power Plant is the only nuclear plant in the state of Missouri and is owned by Ameren Missouri, a St. Louis-based utility company.  Saint Louis University provided transportation between St. Louis and Callaway.

# Holcim Tour

In early September, St. Louis section members had the opportunity to tour Holcim Plant with the professional section.  The plant is the largest cement production center in the world with cutting edge technology.  It was such a great experience; all participants were very impressed by the facility and all the Holcim employees we met!  On the tour we also saw the limestone quarries that can supply the facility for more than its 100-year lifetime.  We learned about the controls and processing procedure.  Some highlights were seeing the football field-long kiln that heats the clinker and the control room with its state-of-the-art panels and monitoring systems.  It takes more than one would think to make cement!  Thank you to the professional section for coordinating the tour; the student members of the Saint Louis University branch especially appreciated the opportunity to attend!

# Student Branch News

## Saint Louis University Student Branch
### August and September Updates

Our chapter has hit the ground running this fall!  We hosted a Welcome Back BBQ for the ECE department and held a social for IEEE members!  We are looking forward to a wide variety of activities this coming semester, such as BillikenBots outreach that started last semester to help spur interest in the STEM fields in the youth around St. Louis, competing in the Black Box competition, and preparing for the Region 5 Conference in the spring.  Over the past few weeks, we've had the opportunity to attend the Callaway and Holcim plant tours with the professional section and greatly enjoyed the experience! We are looking to host speakers from the industry this semester as well.  If you or anyone you know would be interested, please contact us! For any questions or inquires, send us an email at ieeeparks@slu.edu.

SLU IEEE  Student Executive Board

Katharine Foster, Sara Fasching, Mark Wisniewski, Maura Wilson, Jacqueline Decker and Komal Sinha



Pictured left to right, top row: Maura Wilson, Katie Foster, Sara Fasching. Bottom row: Jacqueline Decker, Komal Sinha, Mark Wisniewski

# Student Branch News

## Saint Louis University Student Branch

### Fall 2014 Welcome Back BBQ and Student Fair

# IEEE Senior Member Grade Elevation Night
*with/Section Planning Meeting*

Sponsored by the Saint Louis Section of IEEE

**October 15, 2014**

**6:00 – 7:00 PM
(Planning Meeting)**

**7:00 – 8:30 PM
(Senior Member Drive)**

*Refreshments will be served*

**St. Louis University
Parks College
3450 Lindell Boulevard
St. Louis, MO 63103**

**Room MDH 1074**

**Questions**
sec.stlouis@ieee.org

## About

Senior member is the highest grade for which IEEE members can apply. IEEE members can self-nominate, or be nominated, for Senior member grade.

All members are invited but those interested in becoming elevated are encouraged to attend. The Senior Member Grade Elevation Night is a great opportunity to meet with Senior Members, Fellows, and Honorary Members in order seek out references for your application. The Section will see that sufficient references are on hand and computers are available for online submittal. **Read below on what to bring with you for the event.**

You can perform a self-check if you are qualified at the IEEE website: http://www.ieee.org/membership_services/membership/senior/senior_requirements.html

Note: If you wish serve as a nominator or reference at the event, we ask that you bring your IEEE member number and IEEE web login.

## What to Bring

- IEEE Member Number.
- Electronic resume/CV (DOC or ASCII only) on flash drive or email in advance to  sec.stlouis@ieee.org
- Start and stop date (xx/xx/xxxx) of each degree.
- Ten years of Professional Experience that shows jobs with dates (xx/xx/xxxx).
- Five years of Significant Experience that shows: publications, patents, jobs, teaching, standards work, PE, IEEE/Society experience, any leadership or management experience.
- Current Employment with number of years of experience and title. The Employment must include full physical address and phone number of employer.

## Parking and Map
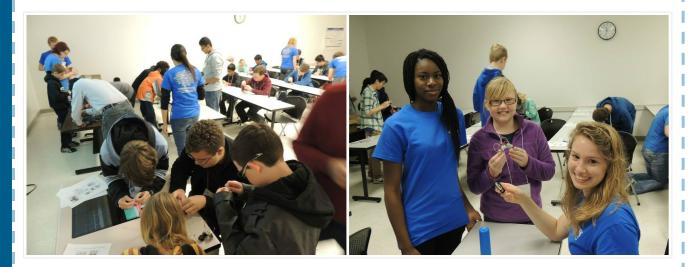
http://sites.ieee.org/stlouis/about/slu-meeting-location/

# Student Branch Events

## Saint Louis University Student Branch

### Billiken Bots to Return in October!

This year we are continuing our outreach program, Billiken Bots at Saint Louis University, on October 25th! We deeply appreciate the St. Louis Section' and IEEE Region 5's generous sponsorship of the event. Once again, we are partnering with the Junior Academy of Science in St. Louis to help get young minds interested in the STEM fields! Our section members and SLU student members are busy getting things ready and planning the day out. This year we will be building mini light-sensitive robots to introduce the participants to circuit assembly. After the building activity, we will let the participants race their robots for some healthy competition! To wrap up the day, we will have lunch and a panel of IEEE members that can answer questions the kids have about majors, career paths, and anything about engineering! We are looking forward to this exciting event! As always, volunteers are much appreciated, if you'd like to come lend a hand, please contact us at ieeeparks@slu.edu!



SLU IEEE Executive Board

Katharine Foster, Sara Fasching, Mark Wisniewski, Komal Sinha, Jacqueline Decker, and Maura Wilson

# Upcoming Events

## Industry Applications Society Chapter Meeting

Monday, October 27, at Noon
Room 101 Emerson Electric Company Hall
301 W. 16th St., Rolla, MO

## Decentralized Control of Distributed Energy Resources and its application to Microgrid Generation Control

*Abstract:* On the distribution side of a power system, there exist many distributed energy resources (DRs) that can be potentially used to provide ancillary services to the grid they are connected to. An example is the utilization of plugin-hybrid vehicles (PHEV) for providing active power for up and down regulation. Proper coordination and control of DRs is key for enabling their utilization for providing these ancillary services. One solution to this coordination and control problem can be achieved through a centralized control strategy where each DR is commanded from a central decision maker. An alternative solution—and the one this talk will focus on—is to distribute the decision-making process among the DRs. In order to achieve so, the DRs need to exchange information with a number of other "close-by" DRs, and subsequently making a local decision based on this available information.

In this talk, we discuss the problem of dispatching a set of distributed energy resources (DRs) without relying on a centralized decision maker. We propose low-complexity iterative algorithms for DR dispatch that rely, at each iteration, on simple computations using local information acquired through exchange of information with neighboring DRs. In general, the goal is for the DRs to collectively provide a certain amount of a resource, which can be either active or reactive power. We address two different problems: (i) the constrained fair-splitting problem, in which the amount of resource that each DR can provide is limited by capacity constraints, but there is no cost associated to the amount of resource provided; and (ii) the constrained optimal dispatch problem, in which there are constraints on DR upper and lower capacity, and each DR has associated a quadratic cost. We illustrate the application of the proposed algorithms to the problem of generation control in microgrids.

# Upcoming Events

## Industry Applications Society Chapter Meeting

Monday, October 27, at Noon
Room 101 Emerson Electric Company Hall
301 W. 16th St., Rolla, MO

### Decentralized Control of Distributed Energy Resources and its application to Microgrid Generation Control

**Biography:** Alejandro Domínguez-García is an Associate Professor in the Electrical and Computer Engineering Department at the University of Illinois, Urbana, where he is affiliated with the Power and Energy Systems area. His research interests lie at the interface of system reliability theory and control, with special emphasis on applications to electric power systems and power electronics.

Dr. Domínguez-García received the Ph.D. degree in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology, Cambridge, MA, in 2007 and the degree of Electrical Engineer from the University of Oviedo (Spain) in 2001. After finishing his Ph.D., he spent some time as a post-doctoral research associate at the Laboratory for Electromagnetic and Electronic Systems of the Massachusetts Institute of Technology. Domínguez-García received the NSF CAREER Award in 2010, and the Young Engineer Award from the IEEE Power and Energy Society in 2012. He is an editor of the IEEE Transactions on Power Systems and the IEEE Power Engineering Letters. He is also a Grainger Associate since August 2011.

*Presented by Alejandro Domínguez-García,*
*University of Illinois at Urbana-Champaign*

**IEEE**
*Advancing Technology for Humanity*

# Saint Louis Section Program, Lean Fundamentals Class

**Sat., Nov 8, 2014**

**8 a.m. – 3:30 p.m.**
**Refreshments and Lunch provided**

**Ameren Headquarters, 1901 Chouteau Av, St Louis, MO 63103**

**Please arrive promptly at 8 am for clearance through security.**

**Please bring a government-issued photo ID. Admittance to the Ameren Facility is not allowed without proper identification**

**RSVP Required:**
**Click here to RSVP**

**Questions:**
**pshil@ameren.com**

**Ben.Cardwell@penta.net**

## About the Presentation

During this one-day Lean Fundamentals class, participants will provide a basic understanding of Lean concepts using hands-on, interactive exercises.

The participants will be introduced to various lean tools, engage in a lean simulation game and learn to use value stream mapping.

The Lean concepts introduced in this training program are derived from the Toyota Production System (TPS). However, the class will be relevant to all types of businesses and organizations.

**Cost**: *Free to students members*

*$25 for Professional Members*

Registration deadline: **Oct 25, 2014**

Course will be limited to 35 attendees.

*As a course of this scope would normally cost approx. $1,000 - $2000. **RSVP's will be considered firm** - please be considerate of other prospective attendees and ensure that you will be able to attend before registering.*

## About the Presenters

The class will be presented by the members of the Ameren Continuous Improvement Team

## Presentation Supported By:

IEEE, Saint Louis Section

Ameren Corp.

# Upcoming Events

## IEEE Black-Box Competition

### Sponsored by the St. Louis Section of IEEE

**Date:**            Saturday, November 15, 2014

**Location:**        Electrical and Computer Engineering, Missouri S&T,
204 Emerson Electric Company Hall
301 W 16th St., Rolla, MO

**Time:**            Registration at 12:30 and Contest from 1:00-4:00 pm.

**Participants:**    Open to all currently enrolled undergraduates at one of the universities in the St. Louis Section of IEEE. Up to four teams from each school are allowed. (If more teams register, the local IEEE Branch Counselor will certify the official teams.) The competition is not open to graduate students.

**Cost:**            The competition is free to everyone!

**Prizes:**          A traveling plaque will go to the winning school with the winners names engraved. Cash prizes for First ($500), Second ($300), and Third ($200) place will be awarded.

**Registration:**    Teams must register by emailing mjzx9c@mst.edu. The names of all team members must be included, along with what school the team is coming from. Registration must be received by **November 10th**.

**Food:**            Food throughout the competition will be provided.

**Judges:**          Each participating school is invited to send one judge. The host school will provide one or two judges and the St. Louis IEEE Section will provide a judge.

**Information:**     Dr. Maciej Zawodniok, 573-308-2319 or mjzx9c@mst.edu

# Upcoming Events

## Rules and Guidelines for the Competition

1. Students shall participate in teams of one to two students, where every team will be given their own laboratory station. The event duration will be three hours. If more groups register than can be accommodated by a single laboratory, the laboratory spaces will be assigned randomly. The quality of equipment may vary between laboratories, but all students will have access to the same equipment including at minimum an oscilloscope, a function generator, a multimeter, a power supply, a breadboard, and common circuit components.

2. Each team will be allowed the use of personal calculators and two bound books of their choice. They may not bring outside laboratory equipment, computers/laptops, unbound reference material, etc. Also, no internet access, computer data acquisition, or software resources will be allowed.

3. The circuit will consist of up to 6 discrete components. The circuit will contain no more than 2 non-linear devices, if any. The non-linear devices are restricted to diodes and transistors (discrete BJT's and mosfets are possible, but ICs will not be included). The three standard linear devices, i.e. R, L, and C, will most likely all be present. The students will have access to four terminals that will be connected to four different points in the circuit. Power connections, if required, will be in addition to the four access terminals and the power specifications will be given.

4. The contest coordinator will be last year's winner. All requests, questions, etc. must go through the coordinator. Help related to using the laboratory equipment will be given to the teams, but no help that directly relates to the circuit will be given. Also, hints to ALL participants may or may not be provided during the competition. This is at the coordinator's discretion.

5. A blue essay book will be supplied each team. The documentation and solutions will consist of only handwritten entries, figures, and data; no printout will be considered. Multiple judges will examine and consider the notebooks only. The winners will be determined by a number of factors, including the correct answer (or proximity to) AND the documented steps and logical conclusions used to get that answer. Thus, a schematic, while necessary, is not sufficient alone.

6. Each judge will rank the teams and award 5 points to first, 4 points to second, 3 points to third, 2 points to fourth, and 1 point to fifth. The points awarded by the judges will be tallied and the winners determined by the scores. Ties will be resolved by a majority vote of the judges.

7. Judges decisions will be by majority vote and will be final with regard to disputes, eligibility, team certification, tie results, and other contest conduct. In particular, cheating will not be tolerated and is grounds for immediate disqualification. Cheating includes disrupting another group, copying another team's work, and collaboration with another group or outside individuals.

# Upcoming Events

## Grounding and Shielding of Electronic Systems

### (How to Diagnose and Solve Electromagnetic Interference

**Presented by Dr. Tom Van Doren**

**Professor Emeritus of Electrical & Computer Engineering**

**Missouri S&T Continuing Education Office**

vandoren@mst.edu     573-578-4193     www.emc-education.com

Additional details including cost, location, and how to register can be found at:

http://dce.mst.edu/noncredit/facetoface/groundingandshieldingstlouis/index.html

### Course Description

Most engineers and technicians using or designing electronic systems have not had formal training concerning grounding and shielding techniques. Learning how to solve electromagnetic interference and signal integrity problems on the job can be very expensive for the employer and frustrating for the engineer. Most of the electromagnetic and circuit principles involved are simple. However, the complexity of many systems masks the logic and simplicity of possible solutions.

This course: treats signals as currents; explains fundamental grounding, shielding, and signal routing principles; clarifies troublesome terminology; and demonstrates many techniques for identifying and fixing electrical interference problems. The principles will be described as concepts rather than theoretical equations. The emphasis on concepts will make the course useful for people with a wide range of experiences. Several interference mechanisms and shielding techniques will be demonstrated.

### Some of the Course Benefits

**This course will help engineers and technicians to:**

**\*Use logical procedures, more than 'trial-and error', to reduce noise problems;**

**\*Improve the signal integrity of high-speed digital waveforms;**

**\*Reduce the time and cost required to meet emission and susceptibility specifications;**

**\*Determine the optimum grounding technique for <u>both</u> safety and low noise;**

# Upcoming Events

## Course Outline

### Tuesday March 24

**1. Introduction**

Misconceptions that can cause EMI Interference reduction techniques Source, coupling path, & victim model Estimating the amount of isolation required Diagnosing an RF susceptibility problem

**2. Current Routing & Least Impedance**

Identifying the "centroid" of a current path Understanding wiring inductance DEMO: Path of least impedance Controlling the current return path How to use the LC = "a constant" concept Electrically large & small structures

**3. Interference Coupling Mechanisms**

Review of the 4 coupling mechanisms Key characteristics of each mechanism Ways to recognize the dominant mechanism Equivalent circuit for each mechanism

**4. Field Containment, Bandwidth, Balance & Resonance**

Routing to provide field containment DEMO: Fields emitted by a coaxial cable Relating bandwidth to transition time CM currents and impedance imbalance Resonances in lumped & distributed circuits DEMO: Predicting & reducing resonances

**5. Grounding for Safety and Noise Reduction**

Signal routing is not the same as grounding Characteristics of a ground structure Safety grounding examples Single point versus a ground grid Avoiding kHz ground loops Grounding analog and digital circuits Grounding signals to chassis for RF & ESD immunity and to reduce RF emissions

### Wednesday March 25

**6. Interference Diagnostic Techniques**

Diagnostic analysis & measurement tools how to determine the dominant mechanism the influence of circuit impedance diagnostic measurement techniques using current and E & H field probes

**7. Filtering to Reduce Conducted Noise**

Current blocking & diverting strategies types of filters CM and DM filter techniques GHz filtering techniques reducing capacitor mutual inductance when to use ferrite beads

**8. Field Containment Using Self Shielding**

The low cost & wide bandwidth approach signal routing provides the containment DEMO: twisted pair versus coaxial cable misuses of twisted pair

**9. Reducing Capacitive Coupled Noise**

DEMO: Capacitive shielding example capacitive noise reduction options

DEMO: Shield connection for twisted pair

**10. Reducing Inductively Coupled Noise**

Reducing mutual inductance eddy current shielding magnetic flux shunting

DEMO: Magnetic shielding options

**11. Electromagnetic Wave Shielding**

Skin effect & RF containment making cable shields effective at GHz Sizing air flow openings controlling CM currents EM containment is more important than grounding