Conference Program

The Nittany Lion Inn
Pennsylvania State University
April 3, 2013

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<td>8:00</td>
<td>Penn State</td>
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<td>8:15-9:35</td>
<td>9:35-10:00</td>
<td>10:05-10:50</td>
<td>11:05-11:45</td>
<td>10:50-11:50</td>
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<td>1:00</td>
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<td>4:15-4:25</td>
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Presentation Feedback Session from 10:30 to 12:00 on Thursday, April 4

Presentation - Ballrooms CDE 11:45 - 1:00 (ticket is required)

Lunch - Ballrooms CDE 11:45 - 1:00 (ticket is required)
Session 10A: Structural Performance (Boardroom 1)

Session Chair: Chris Raebel

6 - Architecturally Exposed Structural Steel: Clear Communication for a Better Project, Terri Boake

55 - Masonry Wall Flashing – Critical to Performance, But Often Overlooked, Scott Siegfried and Erik Valentino

98 - Advancing the Structural Use of Earth-based Bricks: Assessing the Reliability of Existing Testing Procedures, Fliza Walters, Malvizi Baskaran and Felicity Amezgupe


Session 10B: Procedures and Tools for Assessing Risk and Resilience of Buildings (Boardroom 2)

Session Chair: Marty Denholm

High Performance of Buildings, Marty Denholm

Owner Performance Report (OPR): A Simple Performance-based Architect-engineer Tool, Roger Grant

Integrated Rapid Visual Screening, Roger Grant

Vulnerability, Risk, and Loss Assessment of Infrastructure Systems Subjected to Natural Hazards, David Weggel

Session 10B: Getting Published (Ballroom A & B)

How to Get Published in Research Journals, Emma Steele

5:00 p.m. Technical Sessions End

Conference Organization

CONFERENCE CHAIRS:
Chimay Anumba, Penn State, USA
Ali Memari, Penn State, USA

LOCAL ORGANIZING COMMITTEE
Robert Holland, Penn State, USA
Kevin Hooper, Penn State, USA
Robert Leicht, Penn State, USA
Kevin Parfitt, Penn State, USA
Nancy Smith, Penn State, USA
Stephen Treado, Penn State, USA
Jennifer Balsley, AEI, USA
Brittany Notor, AEI Student Chapter, Penn State, USA

AEI CONFERENCE STEERING COMMITTEE
Mohammed Ettouney, Weidlinger Associates Inc., USA
Scott Campbell, Kinetics Noise Control, USA
Abe Lynn, CalPoly, USA
Mike McGeen, Milwaukee School of Engineering, USA
Chuck Meyer, Henry Adams, USA
Brian Noonan, Smith Group, USA
Jay Puckett, University of Wyoming, USA
Thanos Tzempelikos, Purdue University, USA
Fliza Walters, Lawrence Tech University, USA
John Zachar, Milwaukee School of Engineering, USA

INTERNATIONAL SCIENTIFIC COMMITTEE
Ahmed AlGhassani, Higher College of Technology, Oman
Sameera AlZar’ouni, United Arab Emirates Univ., UAE
David Arditi, Illinois Institute of Technology, USA
Baabak Ashuri, Georgia Tech, USA
Randy Burkett, Randy Burkett Lighting Design, USA
Hongyi Cai, University of Kansas, USA
Frank DeTroyer, Katholieke Universiteit Leuven, Belgium
Carrie Dossick, University of Washington, USA
Jonathan Dougherty, Davis Construction, USA
Mohammed Dulaimi, BUiD, UAE
Bilge Erdogan, Heriot-Watt University, UK
Dongping Fang, Tsinghua University, China
Jack Goulding, Univ. of Central Lancashire, UK
David Green, WJE, USA
Ezzat Fahmy, American University in Cairo, Egypt
Conference Organization

Jim Freihaut, Penn State, USA
Ahmad Hamid, Drexel University, USA
Fred Hasler, Kansas State University, USA
Osama Hosny, American University in Cairo, Egypt
Chang-Taek Hyun, University of Seoul, Korea
Lisa Iulo, Penn State, USA
Khalifa al-Jabri, Sultan Qaboos University, Oman
John Kamara, University of Newcastle, UK
Takashi Kaneta, Kyoto University, Japan
Fred Hasler, Kansas State University, USA
Osama Hosny, American University in Cairo, Egypt
Chang-Taek Hyun, University of Seoul, Korea
Lisa Iulo, Penn State, USA
Khalifa al-Jabri, Sultan Qaboos University, Oman
John Kamara, University of Newcastle, UK
Takashi Kaneta, Kyoto University, Japan
Mohamad Kashef, Alhosn University, UAE
Dominic Kelly, SGH, USA
J. J. Kim, Hanyang University, Korea
Mark Konchar, Balfour Beatty Construction, USA
Ozan Koseoglu, Heriot-Watt University, Dubai, UAE
Kelly Krieg, Centria, USA
Angela Lee, University of Salford, UK
Ghang Lee, Yonsei University, Korea
K.M. Liew, City University of Hong Kong, China SAR
Eric Lind, Lutron Electronics, USA
M. Zaimi Bin Abdul Majid, UTM, Malaysia
Jasper Mbachu, Massey University, New Zealand
John Myers, Missouri S & T, USA
Wafaa Nadim, German University, Egypt
Antonio Nanni, University of Miami, USA
Yasemin Nielsen, Abu Dhabi University, UAE
Ute Poerschke, Penn State, USA
Kirti Ruikar, Loughborough University, UK
Eduardo Santos, USP, Brazil
Sevil Sariyildiz, TU Delft, The Netherlands
Bhzad Sidawi, University of Damman, SA
Frank Smith, California State University, Pomona, USA
Rudi Stouffs, NUS, Singapore
Karen Sweeney, Turner Construction, USA
Ron Wakefield, RMIT, Australia
Clarence Waters, University of Nebraska, USA
Dan Willis, Penn State, USA
Session 8A: Energy Efficient Buildings (Boardroom A & B)

Session Chair: Robert Leicht

10:20 a.m. - 12:00 p.m.

101 - Stochastic Energy Analysis of Energy Retrofits
Ralph Muehleisen, Yeonsook Heo, Diane Graziano and Leah Guzowski

102 - Towards an Integrated Support System for High Performance Green Retrofits
Pelin Gultekin, Chimay Anumba and Robert Leicht

110 - Energy Efficiency of External Perforated Window Solar Screens in Desert Environments: Effect of Screen Surface Reflectance
Ahmed Sherif, Abbas El Zafarany and Rasha Arafa

119 - Hourly Plug Load Measurements and Profiles for a Medium Office Building: A Case Study
Payam Delgoshaei, Ke Xu, Scott Wagner, Richard Sweetser and James Freihaut

Session 8B: Building Design and Performance (Boardroom 2)

Session Chair: Ece Erdogmus

95 - Material Condition and Deterioration Assessment Program for a 3rd Century Roman Temple
Ece Erdogmus, Joshua Freedland, Alex Jording, Ariel Kousgaard and Cody Buckley

65 - Seismic Assessment of the Washington Monument and National Cathedral
Erik C. Sohn and Emma Cardini

183 - High Performance Building Design
Charles DeLisio

Session 8C: Energy Auditing and Analysis (Ballroom A & B)

Session Chair: Robert Leicht

101 - Stochastic Energy Analysis of Energy Retrofits
Ralph Muehleisen, Yeonsook Heo, Diane Graziano and Leah Guzowski

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Payam Delgoshaei, Ke Xu, Scott Wagner, Richard Sweetser and James Freihaut

12:00 p.m. - 1:00 p.m.

LUNCH (Ballroom CDE)

Conference Sponsors

The Pennsylvania State University
Department of Architectural Engineering

Architectural Engineering Institute (AEI)
American Society of Civil Engineers

Conference Sponsor - Gold

Proud Sponsor of the Student Competition Team Reception & Banquet Expenses

James G. Davis Construction
Rockville, MD

www.davisconstruction.com

About DAVIS: James G. Davis Construction Corporation (DAVIS) has provided construction services in Maryland, Virginia, and Washington, DC since 1966. We have completed base buildings, renovation, and interior construction projects of all sizes for corporate headquarters, the public sector, law firms, associations, technology companies, telecommunications firms, mission critical facilities, schools, broadcast facilities, restaurants, retail, and many other clients. Many of these projects are LEED certified at the Platinum, Gold, or Silver levels. An employee-owned company, DAVIS’ annual revenue will exceed $800 million this coming year. We have achieved this level of success because we have been fortunate enough to attract and retain some of the brightest and best people in the industry to manage our projects and our firm. DAVIS is a true general contractor, as we employ a skilled labor force of over 250 to self-perform finish carpentry, demolition, drywall, and miscellaneous concrete work, in addition to managing traditionally subcontracted trades. We provide our clients with responsive service, including on-time, quality performance at competitive costs while maintaining an exceptional safety record. DAVIS’ mission is to be considered, The Client's Contractor, as much a member of the owner's professional team as the architect, engineers, and other specialty consultants. This philosophy has led to over 85% of our work being secured through negotiated contracts and many satisfied, repeat clients.
<table>
<thead>
<tr>
<th>Time</th>
<th>Session A</th>
<th>Session B</th>
<th>Session C</th>
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</table>
| 8:45 a.m. - 10:05 a.m. | Session 7A: Facilities Management (Boardroom 1)  
Session Chair: Craig Dubler  
25 - Challenges and Opportunities Involving Facilities Management in Data Handover: London 2012 Case Study, Carmel Lindkvist and Jennifer Whyte | Session 7B: Structural Systems (Boardroom 2)  
Session Chair: Mohammed Et-touney  
23 - Use of Mechanical Couplers in Concrete Columns, Don Philipp and Gilbert Hegemier | Session 7C: Daylighting and Sustainability (Ballroom A & B)  
Session Chair: Richard Mistrick  
102 - A Study of Multi-Zone Daylight-Responsive Dimming Systems, Richard Mistrick and Sarith Subramaniam |
| 10:05 a.m. - 10:20 a.m. | Coffee Break (Boardroom Rotunda)               | Coffee Break (Boardroom Rotunda)               | Coffee Break (Ballroom Atrium)                 |
| 10:20 a.m. - 12:00 p.m. | Session 8A: Energy Efficient Buildings (Boardroom 1)  
Session Chair: Sara Walker  
71 - Analysis of Residential Energy Consumption Characteristics: a Comparative Study Between Two Cities in China and the U.S., Jing Hong and Hazem Rashed-Ali  
38 - Assessment of the Potential Savings Resulting From Shutting Down University Buildings during Periods of Very Low Occupancy: A Case Study, Carlos Torres, Evelio Siller, Yolanda Allen and Jorge Caeiro | Session 8B: Building Design and Performance (Boardroom 2)  
Session Chair: Ece Erdogmus  
28 - Review and Preliminary Evaluation of the Performance of Weather Resistive Barriers Under Seismic Induced Light Frame Wall Deformations, Jennifer Thiede and Ali Memari  
41 - Reducing Impact of Wind on Tall Buildings through Design and Aerodynamic Modifications (Architectural and Structural Concepts to Mitigate Wind Effect on Tall Buildings), Matin Alaghmandan and Mahjoub Elimeiri | Session 8C: Energy Auditing and Analysis (Ballroom A & B)  
Session Chair: Robert Leicht  
46 - Evaluating the Tradeoffs of Occupant Comfort and Energy Savings: A Study of Window Control Sensitivity, James Hauswirth and Gregor Henze  
49 - Housing and Society: Need for Progressive Sustainability Indicators for Societal Sustainability, Renuka Thakore, Jack Goulding and Andrey Benuzh  
76 - Developing a Standard Energy Auditing Process for Pennsylvania State University, Tabitha Sprau Coulter, Craig Dubler and Robert Leicht |
Keynote Speaker

Glenn R. Bell
Senior Principal and Chief Executive Officer
Simpson Gumpertz & Heger,
Waltham, MA


Glenn R. Bell is CEO of Simpson Gumpertz & Heger Inc. (SGH), a national engineering firm engaged in structural engineering and building technology.

Glenn has led the company as CEO since 1995, guiding its growth from 140 to over 440 employees and expansion from two offices to five. He has led major corporate strategic initiatives, such as a full structural reorganization and multiple merger/acquisitions. For the past several years, Structural Engineer Magazine has named SGH one of the best structural engineering firms in the country for which to work.

Glenn is frequent guest speaker on subjects such as sustainable design, integrated design, and developing the next generation of engineers. He was keynote speaker for Structures Congresses 2007 and 2012. He serves on the Advisory Board for The Charles Pankow Foundation, a private nonprofit public benefit foundation with the mission of providing the public with improved quality, efficiency, and value of buildings by advancing innovation in design and construction.

Glenn also works closely with universities in developing engineering curriculum. He currently is a member of the advisory committee for the Department of Architectural Engineering at Pennsylvania State University, and has served on advisory boards at four other universities. In 2010 Glenn was named an Honorary Centennial Fellow of Penn State’s AE program. He has taught at Tufts University and the Massachusetts Institute of Technology, and has been a guest lecturer at numerous other universities.

Glenn joined SGH in 1974 and served as a design engineer working closely with architects to develop unique structures such as SpaceShip Earth, the geodesic dome at Walt Disney World Epcot Center, Steven Holl’s MIT Simmons Hall, and the Bahai Temple now under construction near Santiago Chile.
Joining DAVIS in 1984, Bill Moyer’s greatest strength lies in his ability to develop a true team approach to design and construction. While his title may be Executive Vice President, Bill is more often known as the big picture guy. His incredible technical expertise, encyclopedic building construction knowledge, and remarkable organizational talents have helped ensure DAVIS’ reputation for quality never waivers.

Early on Bill channeled his passion for construction into developing an extensive body of knowledge, and expects the same from every employee. Bill’s unerring attention to detail drives DAVIS’ company-wide focus on quality, from preconstruction through completion, and has significantly contributed to DAVIS’ reputation as an industry leader.

Bill received his bachelor of Architectural Engineering degree (BAE) from the Pennsylvania State University in 1979, with a concentration in Construction Management. He is actively involved in Penn State’s Partnership for Achieving Construction Excellence (PACE), an industry/university partnership focused on education, research and collaboration. While serving on the PACE advisory board, Bill recently received the Excellence Award in recognition for his commitment to construction management education and research. He is also an inductee in to the PACE Construction Hall of Fame. In addition to his commitments to Penn State, Bill is also involved with several other universities, serving on advisory boards and research affiliates programs.

Keynote Speaker

William S. Moyer
Executive Vice-President
James G. Davis Construction (DAVIS)
Rockview, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 5B: Building Mechanical Systems</th>
<th>Session 5C: Construction Engineering and Management - II</th>
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<tr>
<td>3:00 p.m. - 3:20 p.m.</td>
<td>Coffee Break (Boardroom Rotunda)</td>
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<td>3:20 p.m. - 5:00 p.m.</td>
<td>Session 6A: Innovations in Buildings (Boardroom 1)</td>
<td>Sessions Chair: Mohammed Al-Hussein</td>
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<td>34 - Sustainable Innovations in Building Design: The Courtyard and Veranda Concepts in Nigeria, Adetokunbo Ilesanmi and Misan Egbe</td>
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<td>84 - Microclimate Analyses for the Design of Building-Integrated Wind Turbines, Nick Rekstad, Jelena Srebric and Ute Poerschke</td>
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<td>Session 6B: Sustainability of Buildings and Cities (Boardroom 2)</td>
<td>Session Chair: Yasemin Nielsen</td>
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<td>11 - Urban Electricity Systems: A UK Case Study, Sara Walker</td>
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<td>14 - Fire Safety Design and Construction Considerations for Sustainable Residential Structures, Thomas Korman</td>
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<td>100 - Building Sustainability into the UAE: ESTIDAMA, Yasemin Nielsen</td>
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<td>Session 6C: Innovative Building Materials (Ballroom A-B)</td>
<td>Session Chair: Khalifa Al-Jabri</td>
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<td>27 - Low Carbon Construction Materials and Techniques for Sustainable Housing Development in Nigeria, Abiodun Olotuah, Yomi Adeleji, Abraham Taiwo, Dorcas Ayeni, and Gabriel Fadairo</td>
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CONFERENCE PROGRAM

Registration

2013 ASCE Charles Pankow Student Competition Meeting
Nittany Lion Inn (Boardroom 1 & 2)
Directed by: Kenna Chapin
8:00 a.m. - 8:00 p.m.

ASHRAE SHORT COURSE

<table>
<thead>
<tr>
<th>WORKSHOP</th>
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<tr>
<td>Energy Management in New and Existing Buildings (Ballroom A-B) 8:00 - 11:30 a.m. Instructor: Richard Person, P.E.</td>
<td>Design for Tornadoes - CANCELLED (Ballroom C) 8:00 - 11:30 a.m.</td>
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Lunch (Ballroom CDE) - For AEI Conference Registrants Only (Ticket Required)
Introduction/Welcome, David N. Wormley, Dean, College of Engineering 11:45 a.m. - 1:00 p.m.

ASHRAE SHORT COURSE

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<tr>
<th>SESSION</th>
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<tr>
<td>Project Management for Improved IAQ (Ballroom A-B) 1:30 - 4:30 p.m. Instructor: Hoy Bohanon, P.E.</td>
<td>Session 1A: Educational Issues in AE - I (Ballroom C) 1:15 p.m. - 2:55 p.m. Session Chair: Robert Holland 94 - Assessing the Impact of Using Photographic Images to Influence Building Retrofit Design Education, Steven Ayer, John Messner and Chimay Anumba</td>
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</table>
Each attendee will be given 15 minutes for presenting their paper followed by 5 minutes of questions and answers.
| Session 4A: IT Systems for Design and Construction  
(Boardroom 1)  
Session Chair: John Kamara |
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<tr>
<td>89 - Spatial Mapping Approach to Component Tracking Using RTLS System, Abiola Akanmu, Syed Hammad and Ikhlas Abdelqadr</td>
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<tr>
<td>85 - An Integrated Mobile Material Management System for Construction Sites, Zhiliang Ma, Zhe Liu and Dongdong Zhang</td>
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<td>44 - Parametric Design Procedures: A New Approach to Generative-Form in the Conceptual Design Phase, Hardi Abdullah and John Kamara</td>
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<td>77 - A Fuzzy Risk Management Framework for the Egyptian Real Estate Development Projects, Ahmed Aboshady, Mohammed Elbarkouky and Mohammed Marzouk</td>
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| Session 4B: Construction Engineering and Management I  
(Boardroom 2)  
Session Chair: Carrie Dossick |
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<tr>
<td>73 - Predicting Construction Duration with Typical Construction Sequences for High-Rise Buildings, Long Nguyen, Duc Phan and Llewellyn Tang</td>
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<td>108 - Assessment of Effectiveness of Planning Techniques and Tools on Construction Projects in Lagos State, Nigeria, Ayodeji Ogunde and Olabosipo Fagbenle</td>
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<td>3 - Leveling Wood Floors by Jacking - Experiences in a NYC Townhouse Renovation, Ramon Gilsanz, Ted Goldstein and David Hoy</td>
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<td>152 - Building Integration Modeling and the Evolving Standard of Care for Engineers and Architects, Michael E. Peters</td>
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| Session 4C: Building Envelope Systems  
(Ballroom A-B)  
Session Chair: Ali Memari |
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<tr>
<td>56 - Temporary Masonry Stabilization and Containment - How To Address An Unsafe Condition On a Building Façade, Scott Siegfried and Erik Valentino</td>
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<td>79 - Factors Contributing to Global Differences in Building Enclosures, David Tran and Richard Behr</td>
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<tr>
<td>57 - Building Envelope Leakage Measurement Using the Air-Handler Fan Pressurization Approach, Seul-Ki Han and Jae-Won Jeong</td>
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### ASHRAE SHORT COURSE

**Session 2A: Building Retrofits**  
(Ballroom C)  
**Session Chair: Baabak Ashuri**

- 82 - An Approach for Capturing Requirements of Collaborative Design Teams to Facilitate Evaluation of Energy Efficient Retrofit Design Options, Jennifer Frazier, Burcu Akinci and Semih Ergun
- 69 - Methods for Assessing Longitudinal Variations of Energy Production by PV Systems, Seyed Mohsen Shahandashti, Kla Mostaan and Baabak Ashuri
- 10 - Improving Campus Chilled Water Systems with Intelligent Control Valves: a Field Study, Gregor Henze, Walter Henry and Marc Thuillard
- 185 - Delivering a High Performance Team for the South Halls Renovation & New Construction Project at Penn State, Dan Buchta, Robert Grotenthaller
- 182 - Transforming Project Delivery - an Owner’s IPD Journey and Case Study of the Energy Efficient Building HUB Headquarters, Bevan Mace

**Session 2B: High Performance Building Systems**  
(Ballroom D-E)  
**Session Chair: Abdou Karim Jallow**

- 62 - Mortar Joint Maintenance - From Abomination to Preservation, Erik Valentino and Brian Chilton
- 68 - Pre-Occupancy Evaluation of High-Rise Building Forms, Seyed Saleh Kalantari Hemedabadi
- 88 - Process Management Approach for Achieving Total Building Performance: Essential Requirements for Sustainable Construction, Moshood Olawale Fadeyi, Abdou Karim Jallow, Chimay Anumba and Mohammad Dulaimi
- 93 - Building Science Integrated Systems Methodological Framework, Rodrigo Mora
- 52 - Finish Materials of Hospital Operating Rooms of the USA and Egypt: Selection and Actual Performance-in-Use, Ahmed Sherif
## 2013 ASCE Charles Pankow Student Competition Meeting

### Session 3A: Educational Issues in AE - II
(Boardroom 1)
**Session Chair:** Clarence Waters

- **39** - Apparatus for Building Electrical Systems Education, Lisa Lyons and Clarence Waters
- **106** - Supporting Students Structurally: Engaging Architectural Students in Structurally Oriented Haptic Learning Exercises, Rob Whitehead

**Keynote:** Glenn Bell, CEO, Simpson Gumpertz & Heger

Ballroom CDE

**2013 ASCE Charles Pankow Student Competition Meeting**

(Ballroom CDE)

8:40 a.m. - 12:00 p.m.

### Session 3B: Building Control Systems
(Boardroom 2)
**Session Chair:** Gregor Henze

- **7** - Probabilistic Identification of Inverse Building Model Parameters, Gregory Pavlak, Anthony Florita, Gregor Henze and Balaji Rajagopalan
- **66** - Comparison of Shading Control Modes On Offices Space Energy Performance, Hui Shen and Athanasios Tzemelikos

### Session 3C: Building Failures and Forensics
(Ballroom A-B)
**Session Chair:** Kevin Parfitt

- **8** - A Probabilistic Approach to Nonstructural Failure, Jonathan Ochshorn
- **48** - Assessment of the Quality Steel Reinforcement Bars Available in Nigerian Market, Opeyemi Joshua, Kolapo O. Olusola, Calistus Ayegba and Adekunle I. Yusuf

### Session 4A: IT Systems for Design and Construction
(Boardroom 1)
**Session Chair:** John Kamara

- **21** - Exploiting Modern Opportunities in AEC Industry: A Paradigm of Future Opportunities, Jalal Abrishami Shokooh, Jack Gouldin, Abdulkadir Ganah, and Farzad Pour Rahimian

### Session 4B: Construction Engineering and Management I
(Boardroom 2)
**Session Chair:** Carrie Dossick

- **42** - IPD in Practice: Sustaining Collaboration in Healthcare Design and Construction, Carrie Sturts Dossick, Rahman Azari, Yong-Woo Kim and Omar El-Anwar

### Session 4C: Building Envelope Systems
(Ballroom A-B)
**Session Chair:** Ali Memari

- **103** - Hurricane Mitigation Design of Wind and Windborne Debris Protection, Rick De La Guardia

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**Coffee Break (Boardroom Rotunda) 10:20 a.m. - 10:40 a.m.**