

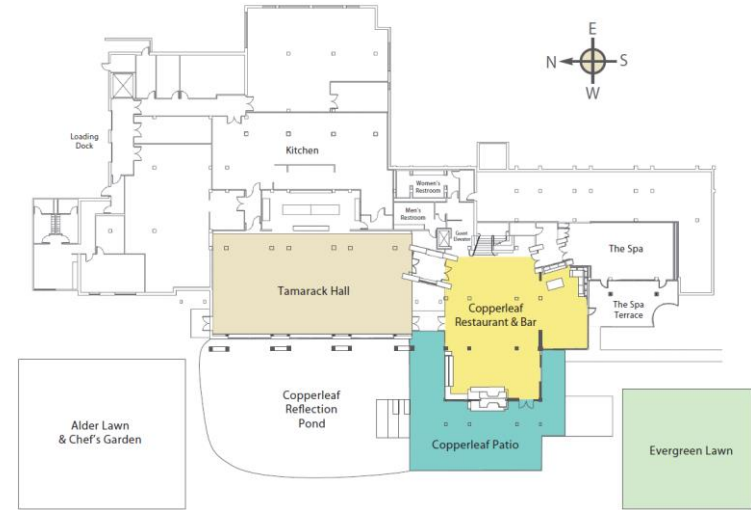
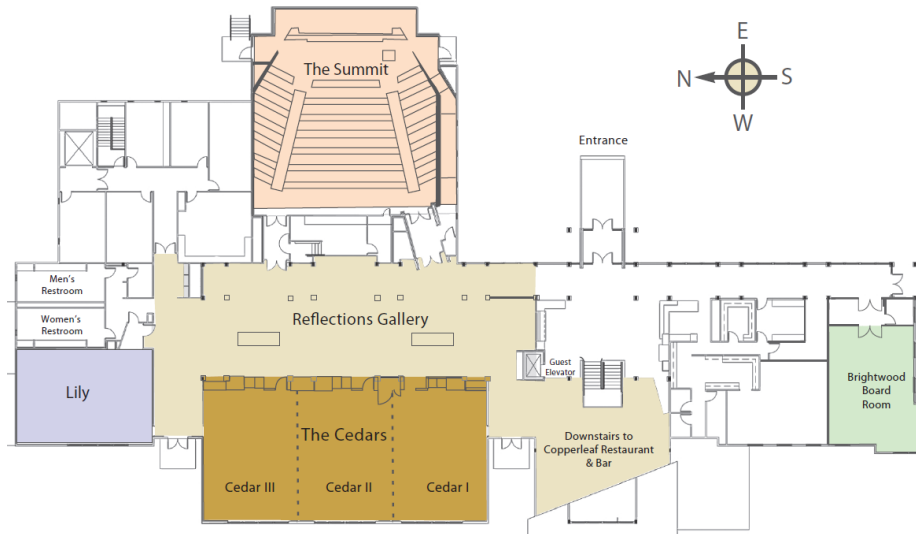


**2017 International Workshop on Computing in Civil Engineering  
(IWCCE 2017)  
June 25 – 27, 2017 @ Seattle, Washington**



(Program Last Updated 6/23/2017)

June 25, 2017 (Sunday)		
	Reflections Gallery	Brightwood Board Room
08:00 – 12:30		
12:30 – 13:00	Registrant Check-in Begins	
13:00 – 14:00		JCCE Editorial Board Meeting
14:00 – 14:30		
14:30 – 15:45		IACCS Meeting <i>(new start time)</i>
15:45 – 16:45		TRB <i>(newly added meeting)</i>
17:00 – 17:45	Poster Session Setup	Global Center Meeting <i>(new start time)</i>
17:45 – 20:00	Poster Session and Welcome Reception	



June 26, 2017 (Monday)					
<b>Tamarack Hall</b>					
07:00 – 08:00	Breakfast				
<b>The Cedars</b>					
08:00 – 08:10	Opening Remark				
08:10 – 09:00	Keynote Speech 1 – <i>by Prof. Lucio Soibelman</i>				
09:00 – 10:00	All Stakeholder Meeting				
10:00 – 10:15	Break				
10:15 – 12:00	<b>Cedar I</b>	<b>Cedar II</b>	<b>Cedar III</b>	<b>The Summit</b>	<b>Brightwood</b>  ExCOM Meeting
	<a href="#">Session 1A</a> <i>(Chair: Lucio Soibelman)</i>	<a href="#">Session 1B</a> <i>(Chair: Carol Menassa)</i>	<a href="#">Session 1C</a> <i>(Chair: Nora El-Gohary)</i>	<a href="#">Session 1D</a> <i>(Chair: Hubo Cai)</i>	
Infrastructure Monitoring, Control and Analysis 58, 110, 133, 255, 276, 316, 338	Construction Management 26, 88, 108, 159, 228, 235, 265	Energy, Sustainability and Resilience 40, 53, 300, 118, 137, 234, 260	BIM & CIM 3, 10, 36, 42, 43, 47, 280		
Lunch (@ <b>Reflections Gallery</b> )					
12:00 – 13:00	<b>Cedar I</b>	<b>Cedar II</b>	<b>Cedar III</b>	<b>The Summit</b>	
	<a href="#">Session 2A</a> <i>(Chair: Pingbo Tang)</i>	<a href="#">Session 2B</a> <i>(Chair: Bill O'Brien)</i>	<a href="#">Session 2C</a> <i>(Chair: Carlos Caldas)</i>	<a href="#">Session 2D</a> <i>(Chair: Patrick Hsieh)</i>	
Intelligent Sensing & Monitoring 29, 39, 79, 114, 169, 190, 258	Modeling & Simulation 22, 41, 119, 148, 171, 229, 250	Monitoring, Control and Analysis 82, 90, 107, 109, 175, 176, 311	Smart Safety and Health 11, 111, 149, 160, 195, 254, 279		
13:00 – 14:45	Break				
14:45 – 15:00	<b>Cedar I</b>	<b>Cedar II</b>	<b>Cedar III</b>	<b>The Summit</b>	
	<a href="#">Session 3A</a> <i>(Chair: Yong Cho)</i>	<a href="#">Session 3B</a> <i>(Chair: Vineet Kamat)</i>	<a href="#">Session 3C</a> <i>(Chair: Fernanda Leite)</i>	<a href="#">Session 3D</a> <i>(Chair: Jiansong Zhang)</i>	
Asset and Facility Management 49, 98, 100, 155, 168, 249	Robotics and Automation 34, 106, 196, 225, 296, 312	BIM & CIM 51, 77, 85, 104, 162, 164	Augmented & Virtual Reality 44, 99, 156, 170, 202, 238		
15:00 – 16:45	Break				
16:45 – 17:00	<b>The Summit</b>				
17:00 – 18:00	DSA Meeting ( <i>update: to start earlier at 16:50</i> )				
18:00 – 19:00	VIMS Meeting				

June 27, 2017 (Tuesday)				
<b>Tamarack Hall</b>				
07:00 – 08:00	Breakfast			
<b>The Cedars</b>				
08:00 – 08:10	Conference Report			
08:10 – 09:00	Keynote Speech 2 – by <i>Prof. Yinhai Wang</i>			
09:00 – 10:00	Demonstration			
10:00 – 10:15	Break			
10:15 – 12:00	<b>Cedar I</b>	<b>Cedar II</b>	<b>Cedar III</b>	<b>The Summit</b>
	<a href="#">Session 4A</a> (Chair: <i>Nora El-Gohary</i> )	<a href="#">Session 4B</a> (Chair: <i>Chimay Anumba</i> )	<a href="#">Session 4C</a> (Chair: <i>Somayeh Asadi</i> )	<a href="#">Session 4D</a> (Chair: <i>Amir Behzadan</i> )
	Data Analytics 80, 124, 157, 203, 244, 293, 294	Intelligent Sensing & Monitoring 23, 184, 215, 242, 267, 278, 313	Modeling & Simulation 18, 165, 241, 209, 220, 252, 262	Safety + Modeling & Simulation 45, 55, 116, 303, 315, 87, 115
12:00 – 13:00	Lunch (@ <b>Reflections Gallery</b> )			
13:00 – 14:45	<b>Cedar I</b>	<b>Cedar II</b>	<b>Cedar III</b>	<b>The Summit</b>
	<a href="#">Session 5A</a> (Chair: <i>Ivan Mutis</i> )	<a href="#">Session 5B</a> (Chair: <i>Mani Golparvar-Fard</i> )	<a href="#">Session 5C</a> (Chair: <i>Mario Bergés</i> )	<a href="#">Session 5D</a> (Chair: <i>Ming Lu</i> )
	BIM & CIM 186, 191, 208, 259, 297, 309, 317	Construction Management 84, 231, 121, 123, 257, 261, 268	Energy, Sustainability and Resilience 207, 213, 251, 266, 274, 284, 314	Project Planning and Control 13, 19, 91, 121, 206, 222, 270, 282
14:45 – 15:00	Break			
15:00 – 16:45	<b>Cedar I</b>	<b>Cedar II</b>	<b>Cedar III</b>	<b>The Summit</b>
	<a href="#">Session 6A</a> (Chair: <i>Timo Hartmann</i> )	<a href="#">Session 6B</a> (Chair: <i>Shih-Chung Kang</i> )	<a href="#">Session 6C</a> (Chair: <i>Changbum Ahn</i> )	<a href="#">Session 6D</a> (Chair: <i>SangHyun Lee</i> )
	BIM & CIM 179, 193, 194, 224, 245, 246, 290	Education 9, 138, 150, 153, 205, 329	Design Management and Collaboration 70, 86, 96, 105, 240, 271, 102	Intelligent Sensing & Monitoring 37, 63, 129, 199, 200, 247, 273
16:45 – 17:00	Break			
<b>The Summit (new location)</b>				
17:00 – 18:00	EDU Meeting			
<b>The Cedars (new location)</b>				
18:00 – 20:00	Banquet, Award, and Closing			

**Session 1A (Infrastructure Monitoring, Control and Analysis): 10:15 – 12:00 on June 26, 2017 Monday**

- #58 3D APPROACH FOR REPRESENTING UNCERTAINTIES OF UNDERGROUND UTILITY DATA  
Léon olde Scholtenhuis\*, Universiteit Twente; Sisi Zlatanova, Delft University of Technology; Xander den Duijn, Delft University of Technology
- #110 INTEGRATING HIGHWAY PROJECTS DATA IN GIS FOR MAINTENANCE AND REHABILITATION PLANNING: APPLICATIONS, CHALLENGES, AND RECOMMENDATIONS  
Jojo France-Mensah\*, University of Texas at Austin; Bharathwaj Sankaran, University of Texas at Austin; Bill O'Brien, University of Texas at Austin
- #133 REPRESENTATION REQUIREMENTS FOR LASER SCAN BASED PROBABILISTIC CONDITION ASSESSMENT OF BRIDGES  
Varun Kasireddy\*, Carnegie Mellon University; Burcu Akinci, Carnegie Mellon University
- #255 TRACKING STRUCTURAL DEFORMATIONS VIA AUTOMATED SAMPLE-BASED POINT CLOUD ANALYSIS  
Bahman Jafari, George Mason University; Ali Khaloo, George Mason University; David Lattanzi\*, George Mason University
- #276 AN AUTOMATIC ROBUST POINT CLOUD REGISTRATION ON CONSTRUCTION SITES  
Pileun Kim\*, Georgia Institute of Technology; Yong Cho, Georgia Institute of Technology
- #316 AN AUTONOMOUS VIDEO PROCESSING METHOD FOR CRACK DETECTION ON METALLIC SURFACES BASED ON TEXTURE ANALYSIS AND BAYESIAN DATA FUSION  
Fu-Chen Chen, Purdue University; Mohammad Jahanshahi\*, Purdue University; Rih-Teng Wu, Purdue University; Chris Joffe, Electric Power Research Institute
- #338 A PRELIMINARY STUDY ON DISASTER WASTE DETECTION AND VOLUME ESTIMATION BASED ON 3D SPATIAL INFORMATION  
Hyungtaeck Yoo\*, Seoul National University; Hyunwoo Lee, Seoul National University; Seokho Chi, Seoul National University; Bon-Gang Hwang, National University of Singapore; Jinwoo Kim, Seoul National University

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**Session 1B (Construction Management): 10:15 – 12:00 on June 26, 2017 Monday**

- #26 INVESTIGATING THE PERFORMANCE OF RELATIONAL CONTRACTS USING SOCIAL NETWORK ANALYSIS  
Mahmoud Abd Al-Moneim\*, Orascom Construction Industry; Omar El-Anwar, Cairo University; Islam El-adaway, University of Tennessee
  
- #88 3D MODEL-BASED QUANTITY TAKE-OFF FOR CONSTRUCTION ESTIMATES  
Pengxiang Han, University of Alberta; Ming-Fung Francis Siu, University of Alberta; Simaan AbouRizk\*, University of Alberta; Di Hu, PCL Industrial Management Inc.; Ulrich Hermann, PCL Industrial Management Inc.
  
- #108 CONSTRUCTION METHOD MODELS USING CONTEXT AWARE CONSTRUCTION REQUIREMENTS FOR AUTOMATED SCHEDULE GENERATION  
Justin Ker-Wei Yeoh\*, National University of Singapore; Thi Qui Nguyen, National University of Singapore; Ernest L.S. Abbott, National University of Singapore
  
- #159 MIXED REALITY FOR ELECTRICAL PREFABRICATION TASKS  
Jad Chalhoub\*, Arizona State University; Steven Ayer, Arizona State University
  
- #228 LONG TERM CHANGE PATTERN ANALYSIS OF BIDDING PRICE BASED ON NON-PARAMETRIC FRAMEWORK  
Yang Cao\*, Georgia Institute of Technology; Baabak Ashuri, Georgia Institute of Technology
  
- #235 TOWARDS DEVELOPING AN ONTOLOGY FOR EARTHWORK OPERATIONS  
Alhusain Taher, Concordia University; Faridaddin Vahdatikhaki, University of Twente; Amin Hammad\*, Concordia University
  
- #265 SINGLE TOWER CRANE ALLOCATION USING ANT COLONY OPTIMIZATION  
Mohamed Abdel-Raheem\*, University of Texas Rio Grande Valley; Carlos Trevino, University of Texas Rio Grande Valley

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**Session 1C (Energy, Sustainability and Resilience): 10:15 – 12:00 on June 26, 2017 Monday**

- #40 ANALYSIS OF TIME DELAY INTERVAL AND ENERGY LOAD VARIATION FOR NON-INTRUSIVELY EXTRACTING OCCUPANTS' ENERGY-USE INFORMATION IN COMMERCIAL BUILDINGS  
Hamed Nabizadeh Rafsanjani\*, University of Nebraska-Lincoln; Changbum Ahn, University of Nebraska-Lincoln; Jiayu Chen, City University of Hong Kong
  
- #53 MODELLING THE DYNAMIC INTERACTION BETWEEN BUILDING PERFORMANCE AND OCCUPANT WELL-BEING  
Flavia Grey Rodriguez\*, Stanford University; Renate Fruchter, Stanford University
  
- #300 UNDERSTANDING BUILDING ENERGY USE MODES AND THERMAL COMFORT FOR IMPROVED ENERGY EFFICIENCY AND SATISFACTION  
Kadir Amasyali\*, University of Illinois at Urbana-Champaign; Nora El-Gohary, University of Illinois, Urbana-Champaign
  
- #118 DATA SENSING APPROACHES TO MONITORING BUILDING ENERGY USE AND OCCUPANT BEHAVIOR  
Yewande Abraham\*, Penn State University; Chimay Anumba, University of Florida, Gainesville; Somayeh Asadi, Penn State
  
- #137 BIG BUILDINGS AND BIG DATA: DO ENERGY DISCLOSURE POLICIES IMPACT ENERGY USE OVER TIME?  
Constantine Kontokosta\*, New York University; Sokratis Papadopoulos, New York University
  
- #260 DATA-DRIVEN RESIDENTIAL BUILDING ENERGY CONSUMPTION PREDICTION FOR SUPPORTING MULTISCALE SUSTAINABILITY ASSESSMENT  
Lufan Wang\*, University of Illinois at Urbana Champaign; Nora El-Gohary, University of Illinois, Urbana-Champaign
  
- #234 SPATIALLY CONSTRAINED DECENTRALIZATION OF URBAN ENERGY SUPPLY DRIVEN BY FLUCTUATIONS IN HUMAN MOBILITY  
Neda Mohammadi\*, Georgia Institute of Technology; John Taylor, Georgia Institute of Technology

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**Session 1D (BIM & CIM): 10:15 – 12:00 on June 26, 2017 Monday**

- #3 BIM TO FACILITIES MANAGEMENT: PRESENTING A PROVEN WORKFLOW FOR INFORMATION EXCHANGE  
Alireza Borhani\*, University of Washington; Hyun Woo Lee, University of Washington; Carrie Stuarts Dossick, University of Washington; Laura Osburn, University of Washington; Marc Kinsman, Mortenson Construction
  
- #10 CONCEPTS FOR FORMAL MODELING AND MANAGEMENT OF BUILDING DESIGN OPTIONS  
Hannah Mattern\*, Ruhr University Bochum; Markus König, Ruhr University Bochum
  
- #36 INTEGRATING BIM AND OPTIMIZATION TECHNIQUES FOR ENHANCED TOWER CRANE PLANNING  
Yuanshen Ji\*, University of Texas at Austin; Bharathwaj Sankaran, University of Texas at Austin; Jiyong Choi, University of Texas at Austin; Fernanda Leite, University of Texas at Austin
  
- #42 APPLIED BIM: AMT AND MTSP INTEGRATED APPROACH FOR THE INTERIOR PATROL ROUTING PROBLEM  
Chun-Hao Chen, National Taiwan University; Albert Chen\*, National Taiwan University
  
- #43 A SEMI-AUTOMATIC APPROACH TO DETECT STRUCTURAL COMPONENTS FROM CAD DRAWINGS FOR CONSTRUCTING AS-IS BIM OBJECTS  
Qiuchen Lu\*, HKU; Sanghoon Lee, The University of Hong Kong
  
- #47 METHOD OF BRIDGE STRUCTURAL ANALYSIS BASED ON BRIDGE INFORMATION MODELING  
Rucheng Xiao, Tongji University; Yu Lian, Sichuan Development and Reform Commission; Bin Sun\*, Tongji University; Xinwei Zhao, Tongji University; Zhao Liu, Shanghai Municipal Engineering Design Institute (Group) Ltd.; Pingbo Tang, Arizona State University
  
- #280 A CASE STUDY IN DATA VISUALIZATION FOR LINKED BIM AND BMS DATA  
Jennifer Lather\*, Pennsylvania State University; Robert Amor, University of Auckland; John Messner, Pennsylvania State University

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**Session 2A (Intelligent Sensing & Monitoring): 13:00 – 14:45 on June 26, 2017 Monday**

- #29 A PERSONALIZED HVAC CONTROL SMARTPHONE APPLICATION FRAMEWORK FOR IMPROVED HUMAN HEALTH AND WELL-BEING  
Da Li, University of Michigan; Carol Menassa\*, University of Michigan; Vineet Kamat, University of Michigan
- #39 AUTOMATED CHANGE DIAGNOSIS OF SINGLE-COLUMN-PIER BRIDGES BASED ON 3D IMAGERY DATA  
Ying Shi, Southeast University; Wen Xiong\*, Southeast University; Vamsisai Kalasapudi, Arizona State University; Chao Geng, Anhui Transportation Holding Group Co., Ltd; Cheng Zhang, Arizona State University; Pingbo Tang, Arizona State University
- #79 USING PHOTOMETRIC STEREO METHOD IN EVALUATING THE VOLUME OF POTHOLES  
Peng Yuan Chen\*, National Taiwan University; Shih-Chung Kang, National Taiwan University
- #114 COMPARISON OF TRADITIONAL PHASE SHIFT LASER SCANNING AND INFRARED SCANNING TECHNIQUES  
Nathan Blinn, University of Florida; Ray Issa\*, University of Florida
- #169 MOBILE ASSET TRACKING FOR DYNAMIC 3D CRANE WORKSPACE GENERATION IN REAL TIME  
Jingdao Chen, Georgia Institute of Technology; Yihai Fang, Georgia Institute of Technology; Yong Cho\*, Georgia Institute of Technology
- #190 VISUAL DATA ANALYTICS FOR PROACTIVE PROJECT CONTROLS  
Jacob Lin\*, University of Illinois at Urbana-Champaign; Mani Golparvar-Fard, University of Illinois at Urbana-Champaign
- #258 AN INTERACTIVE MODEL-DRIVEN PATH PLANNING AND DATA CAPTURE SYSTEM FOR CAMERA-EQUIPPED AERIAL ROBOTS ON CONSTRUCTION SITES  
Amir Ibrahim\*, University of Illinois at Urbana-Champaign; Dominic Roberts, University of Illinois at Urbana-Champaign; Mani Golparvar-Fard, University of Illinois at Urbana-Champaign; Timothy Bretl, University of Illinois at Urbana-Champaign

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**Session 2B (Modeling & Simulation): 13:00 – 14:45 on June 26, 2017 Monday**

- #22 UNCERTAINTY ANALYSIS FOR THERMAL COMFORT EVALUATION IN NATURALLY VENTILATED BUILDINGS  
Jianli Chen\*, Georgia Institute of Technology
- #41 A BASIC STUDY ON THE EVACUATION CHARACTERISTICS OF HIGH-RISE BUILDING THROUGH COMPARING EVACUATION EXPERIMENT AND SIMULATIONS – A CASE STUDY IN KOREA  
JaeHong Kim\*, Oklahoma state university; Yongwei Shan, Oklahoma State University; Junho Choi, Pukyung National University; Phil Lewis, Oklahoma State University; Wonhwa Hong, Kyungpook National University
- #119 PLANNING ROUGH-GRADING PROJECTS: CAT HANDBOOK VS. RS MEANS  
Chaojue Yi, University of Alberta; Ming Lu\*, University of Alberta
- #148 INTEGRATING ACTIVITIES RISK AND TRAFFIC MICROSIMULATION DATA FOR TEMPORAL RISK ASSESSMENT IN CONSTRUCTION WORK ZONES: A PROOF OF CONCEPT  
Bharathwaj Sankaran\*, University of Texas at Austin; Jojo France-Mensah, University of Texas at Austin; Bill O'Brien, University of Texas at Austin
- #171 DEVELOPMENT OF REAL-TIME INDOOR TEMPERATURE DISTRIBUTION SIMULATION: A PILOT STUDY  
Chanachok Chokwitthaya\*, Louisiana State University; Yimin Zhu, Louisiana State University; Suraj Talele, University of North Texas; Caleb Traylor, University of North Texas; Yong Tao, University of North Texas
- #229 MULTI ASSET OPTIMIZATION OF ROADWAYS ASSET MAINTENANCE  
Omidreza Shoghli\*, Western Carolina University; Jesus M. de la Garza, Virginia Tech
- #250 IMPLEMENTATION VERIFICATION AND VALIDATION OF 3D STRUCTURAL ELEMENTS IN A NUMERICAL TOOL FOR NONLINEAR SSI SEISMIC ANALYSIS  
Floriana Petrone\*, Lawrence Berkeley National Laboratory; Jenna Wong, Lawrence Berkeley National Laboratory; David McCallen, University of California Office of the President; Frank McKenna, University of California, Berkeley

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**Session 2C (Monitoring, Control and Analysis): 13:00 – 14:45 on June 26, 2017 Monday**

- #82 GEOMETRY-BASED OPTIMIZED POINT CLOUD COMPRESSION METHODOLOGY FOR CONSTRUCTION AND INFRASTRUCTURE MANAGEMENT  
Jiawei Chen\*, Arizona State University; Cheng Zhang, Arizona State University; Pingbo Tang, Arizona State University
- #90 A COMPREHENSIVE SPATIO-TEMPORAL NETWORK-BASED MODEL FOR DYNAMIC RISK ANALYSIS ON STRUCK-BY-EQUIPMENT HAZARD  
Jun Wang\*, McMaster University; Saiedeh Razavi, McMaster University
- #107 PROBABILISTIC BUILDING ENERGY PERFORMANCE ANALYSIS OF ULTRA HIGH PERFORMANCE FIBER REINFORCED CONCRETE FAÇADE PANELS  
Mohsen Shahandashti\*, University of Texas at Arlington; Bahram Abediniangerabi, University of Texas at Arlington; Bradley Bell, University of Texas at Arlington; Simon Chao, University of Texas at Arlington
- #109 IDENTIFYING CRITICAL LINKS IN WATER SUPPLY SYSTEMS SUBJECT TO VARIOUS EARTHQUAKES TO SUPPORT INSPECTION AND RENEWAL DECISION MAKING  
Binaya Pudasaini, University of Texas at Arlington; Mohsen Shahandashti\*, University of Texas at Arlington; Mohammad Razavi, Risk Solution Management, Inc.
- #175 EMERGENCE OF RESILIENCE FROM INFRASTRUCTURE DYNAMICS: A SIMULATION FRAMEWORK FOR THEORY BUILDING  
Kambiz Rasoulkhani\*, Texas A&M University; Maria Presa Reyes, Florida International University; Ali Mostafavi, Texas A&M University
- #176 A SCO-ENABLED CONSTRUCTION EQUIPMENT MANAGEMENT SYSTEM  
Yuhan Niu\*, The University of Hong Kong; Weisheng Lu, The University of Hong Kong; Diandian Liu, The University of Hong Kong; Ke Chen, The University of Hong Kong; Fan Xue, The University of Hong Kong
- #311 MEASURING THE IMPACT OF WORKING MEMORY LOAD ON THE SAFETY PERFORMANCE OF CONSTRUCTION WORKERS  
Sogand Hasanzadeh\*, University of Nebraska-Lincoln; Bac Dao, University of Nebraska-Lincoln; Behzad Esmaeili, University of Nebraska-Lincoln; Michael D. Dodd, University of Nebraska-Lincoln

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**Session 2D (Smart Safety and Health): 13:00 – 14:45 on June 26, 2017 Monday**

- #11 LEVEL-OF-EXPERTISE CLASSIFICATION FOR IDENTIFYING SAFE AND PRODUCTIVE MASONS  
Abdullatif Alwasel, University of Waterloo; Mohammad Nahangi\*, University of Waterloo; Carl Haas, University of Waterloo; Eihab Abdel-Rahman, University of Waterloo
- #111 GAZETTEERS FOR INFORMATION EXTRACTION APPLICATIONS IN CONSTRUCTION SAFETY MANAGEMENT  
Nai-Wen Chi\*, National Taiwan University; Ken-Yu Lin, University of Washington; Nora El-Gohary, University of Illinois, Urbana-Champaign; Shang-Hsien Hsieh, National Taiwan University
- #149 AN ENSEMBLE APPROACH FOR CLASSIFICATION OF ACCIDENT NARRATIVES  
Chalani Udhyami Ubeynarayana, National University of Singapore; Yang Miang Goh\*, National University of Singapore
- #160 INVESTIGATION OF THE RELATIONSHIP BETWEEN CONSTRUCTION WORKERS' PSYCHOLOGICAL STATES AND THEIR UNSAFE BEHAVIORS USING VIRTUAL ENVIRONMENT-BASED TESTING  
Yantao Yu\*, Tsinghua University; Jiansong Zhang, Western Michigan University; Hongling Guo, Tsinghua University
- #195 ENHANCING MOTION TRAJECTORY PREDICTION FOR SITE SAFETY BY INCORPORATING ATTITUDE TOWARD RISK  
Khandakar Rashid, Missouri State University; Amir Behzadan\*, Missouri State University
- #254 JOINT REASONING OF VISUAL AND TEXT DATA FOR CONSTRUCTION SAFETY INSPECTION  
Shuai Tang\*, University of Illinois at Urbana-Champaign; Mani Golparvar-Fard, University of Illinois at Urbana-Champaign
- #279 ANALYZING SPATIAL PATTERNS OF WORKERS' GAIT CYCLES FOR LOCATING LATENT FALL HAZARDS  
Kanghyeok Yang\*, University of Nebraska at Lincoln; Changbum Ahn, University of Nebraska-Lincoln; Mehmet Vuran, University of Nebraska-Lincoln; Hyunsoo Kim, University of Nebraska-Lincoln

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**Session 3A (Asset and Facility Management): 15:00 – 16:45 on June 26, 2017 Monday**

- #49 OPTIMIZING RAILROAD BRIDGE NETWORKS MANAGEMENT USING MIXED INTEGER LINEAR PROGRAMMING AND GENETIC ALGORITHM  
Amirhosein Jafari\*, University of New Mexico; Guillermo Pérez, University of New Mexico; Fernando Moreu, University of New Mexico; Vanessa Valentin, University of New Mexico
  
- #98 THE UTILIZATION OF AN ASSET SAFETY IDENTIFICATION TOOL (ASIT) TO SUPPORT SAFETY DURING FACILITIES MANAGEMENT  
Eric Wetzel\*, Auburn University; Jason Lucas, Clemson University; Walid Thabet, Virginia Tech
  
- #100 RISK-AWARE MULTI-OBJECTIVE OPTIMIZATION OF CAPITAL STRUCTURE FOR PRIVATE FINANCING IN INFRASTRUCTURE PROJECTS  
Shuai Li\*, Purdue University; Hubo Cai, Purdue University
  
- #155 INTEGRATION OF BIM AND UTILITY SENSOR DATA FOR FACILITIES MANAGEMENT  
Kamal Suprabhas\*, Purdue University; Hazar Dib, Purdue University
  
- #168 UNSUPERVISED RECOGNITION OF VOLUMETRIC STRUCTURAL COMPONENTS FROM BUILDING POINT CLOUDS  
Jingdao Chen, Georgia Institute of Technology; Yihai Fang, Georgia Institute of Technology; Yong Cho\*, Georgia Institute of Technology
  
- #249 DEFINING A TAXONOMY FOR VIRTUAL 3D CITY MODEL USE CASES WITH A FOCUS ON FACILITY ASSET MANAGEMENT – A VIRTUAL CAMPUS CASE STUDY  
Zhouqian Jiang\*, Pennsylvania State University; John Messner, Pennsylvania State University; Craig Dubler, Pennsylvania State University

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**Session 3B (Robotics and Automation): 15:00 – 16:45 on June 26, 2017 Monday**

- #34 AUTOMATIC BARCODE EXTRACTION FOR EFFICIENT LARGE-SCALE INVENTORY MANAGEMENT  
Lichao Xu\*, University of Michigan; Vineet Kamat, University of Michigan; Carol Menassa, University of Michigan
- #106 FEASIBILITY OF A DRONE-BASED ON-SITE PROXIMITY DETECTION IN AN OUTDOOR CONSTRUCTION SITE  
Daeho Kim\*, University of Michigan; Kaiqi Yin, University of Michigan; Meiyin Liu, University of Michigan; SangHyun Lee, University of Michigan; Vineet Kamat, University of Michigan
- #196 CONSTRUCTION PRODUCTIVITY AND ERGONOMIC ASSESSMENT USING MOBILE SENSORS AND MACHINE LEARNING  
Nipun Nath, Missouri State University; Amir Behzadan\*, Missouri State University
- #225 DETECTING AND CLASSIFYING CRANES USING CAMERA-EQUIPPED UAVS FOR MONITORING CRANE-RELATED SAFETY HAZARDS  
Dominic Roberts\*, University of Illinois at Urbana-Champaign; Mani Golparvar-Fard, University of Illinois at Urbana-Champaign; Timothy Bretl, University of Illinois at Urbana-Champaign
- #296 ROLES, BENEFITS, AND CHALLENGES OF USING UAV TO MONITOR INDOOR CONSTRUCTION  
Brenda McCabe\*, University of Toronto; Hesam Hamledari, Stanford University; Ehsan Rezazadeh Azar, Lakehead University; Arash Shahi, University of Toronto; Pouya Zangeneh, University of Toronto
- #312 APPLICATION OF ASSISTIVE WEARABLE ROBOTICS TO ALLEVIATE CONSTRUCTION WORKFORCE SHORTAGE: CHALLENGES AND OPPORTUNITIES  
Chao Wang\*, Louisiana State University; Laura Ikuma, Louisiana State University; Jan Hondzinski, Louisiana State University; Marcio de Queiroz, Louisiana State University

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**Session 3C (BIM & CIM): 15:00 – 16:45 on June 26, 2017 Monday**

- #51 POST-EARTHQUAKE FIRE SIMULATIONS OF BUILDINGS CONSIDERING THE SEISMIC DAMAGE OF SPRINKLER SYSTEMS  
Zhen Xu, University of Science and Technology Beijing; Zongcai Zhang, University of Science and Technology Beijing; Xinzheng Lu\*, Tsinghua University
- #77 A FRAMEWORK FOR RULE-BASED VALIDATION OF IFC SPACE BOUNDARIES FOR BUILDING ENERGY ANALYSIS  
Huaquan Ying\*, The University of Hong Kong; Sanghoon Lee, The University of Hong Kong
- #85 BIM-BASED LIFE CYCLE ASSESSMENT AND COSTING OF BUILDINGS: CURRENT TRENDS AND OPPORTUNITIES  
Martin Nwodo\*, University of Florida, Gainesville; Chimay Anumba, University of Florida, Gainesville; Somayeh Asadi, Pennsylvania State University
- #104 MODEL-BASED BENCHMARKING FOR HEALTHCARE PROJECTS: SYSTEM REQUIREMENTS AND DEMONSTRATION  
Jiyong Choi\*, University of Texas at Austin; Fernanda Leite, University of Texas at Austin; Daniel Oliveira, Construction Industry Institute
- #162 LINKING BIM AND GIS MODELS IN INFRASTRUCTURE BY EXAMPLE OF IFC AND CITYGML  
Simon Vilgertshofer\*, Technical University of Munich; Julian Amann, Technical University of Munich; Bruno Willenborg, Technical University of Munich; Andre Borrmann, The Technical University of Munich; Thomas H. Kolbe, Technical University of Munich
- #164 AUTOMATED WOOD CONSTRUCTION COST ESTIMATION  
Temitope Akanbi\*, Western Michigan University; Jiansong Zhang, Western Michigan University

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**Session 3D (Augmented & Virtual Reality): 15:00 – 16:45 on June 26, 2017 Monday**

- #44 HIGH-FIDELITY VISUALIZATION OF FIRE FOLLOWING EARTHQUAKE  
Xinzheng Lu\*, Tsinghua University; Xiang Zeng, Tsinghua University; Zhen Xu, University of Science and Technology Beijing; Qingle Cheng, Tsinghua University
  
- #99 QUANTIFYING HUMAN EXPERIENCE IN INTERIOR ARCHITECTURAL SPACES  
Ahmed Radwan\*, New York University; Semiha Ergan, New York University
  
- #156 APPLICATION OF IMMERSIVE VIRTUAL ENVIRONMENT (IVE) IN OCCUPANT ENERGY-USE BEHAVIOR STUDIES USING PHYSIOLOGICAL RESPONSES  
Sanaz Saeidi\*, Louisiana State University; Adam Lowe, Louisiana State University; Neil Johannsen, Louisiana State University; Yimin Zhu, Louisiana State University
  
- #170 THE IMPACT OF LIGHTING SIMULATION DISCREPANCIES ON HUMAN VISUAL PERCEPTION AND ENERGY BEHAVIOR SIMULATIONS IN IMMERSIVE VIRTUAL ENVIRONMENT  
Chanachok Chokwitthaya\*, Louisiana State University; Sanaz Saeidi, Louisiana State University; Yimin Zhu, Louisiana State University; Robert Kooima, Louisiana State University
  
- #202 INTERACTIVE HIGHWAY CONSTRUCTION SIMULATION USING GAME ENGINE AND VIRTUAL REALITY FOR EDUCATION AND TRAINING PURPOSE  
Majid Mastali\*, Western Michigan University; Jiansong Zhang, Western Michigan University
  
- #238 DEVELOPMENT OF IMMERSIVE PERSONALIZED TRAINING ENVIRONMENT FOR CONSTRUCTION WORKERS  
Idris Jeelani\*, North Carolina State University; Kevin Han, North Carolina State University; Alex Albert, North Carolina State University

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**Session 4A (Data Analytics): 10:15 – 12:00 on June 27, 2017 Tuesday**

- #80 SENTIMENT ANALYSIS FOR THE CONSTRUCTION INDUSTRY: A CASE STUDY OF WEIBO IN CHINA  
Maggie Tang\*, West Virginia University; Yiming Zhang, West Virginia University; Fei Dai, West Virginia University;  
Yoojung Yoon, West Virginia University; Yangqiu Song, West Virginia University
- #124 TOWARDS AUTOMATED INFERENCE OF OCCUPANT BEHAVIORAL DYNAMICS USING PLUG-LOAD  
ENERGY DATA  
Andrew Sonta, Stanford University; Perry Simmons, Stanford University; Rishee Jain\*, Stanford University
- #157 DEEP ACTIVE LEARNING FOR CIVIL INFRASTRUCTURE DEFECT DETECTION AND CLASSIFICATION  
Chen Feng\*, Mitsubishi Electric Research Laboratories (MERL); Ming-Yu Liu, Mitsubishi Electric Research Laboratories  
(MERL); Chieh-Chi Kao, University of California, Santa Barbara; Teng-Yok Lee, Mitsubishi Electric Research  
Laboratories (MERL)
- #203 AUTOMATED RECOGNITION AND LOCALIZATION OF PARKING SIGNS USING STREET-LEVEL IMAGERY  
Qazaleh Mirsharif, University of Houston; Théophile Dalens, Spot Angels; Mehdi Sqalli, Spot Angels; Vahid Balali\*,  
California State University Long Beach
- #244 SIMILARITY-BASED DEPENDENCY PARSING FOR EXTRACTING DEPENDENCY RELATIONS FROM BRIDGE  
INSPECTION REPORTS  
Kaijian Liu\*, University of Illinois at Urbana-Champaign; Nora El-Gohary, University of Illinois at Urbana-Champaign
- #293 STAKEHOLDER OPINION CLASSIFICATION FOR SUPPORTING LARGE-SCALE TRANSPORTATION PROJECT  
DECISION MAKING  
Xuan Lv\*, University of Illinois at Urbana-Champaign; Nora El-Gohary, University of Illinois at Urbana-Champaign
- #294 PREDICTING LEAKS IN NATURAL GAS DISTRIBUTION NETWORKS USING GENERALIZED LINEAR  
MODELS  
Yasamin Tari\*, Carnegie Mellon University; Matteo Pozzi, Carnegie Mellon University; Mario Bergés, Carnegie Mellon  
University; Burcu Akinci, Carnegie Mellon University

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**Session 4B (Intelligent Sensing & Monitoring): 10:15 – 12:00 on June 27, 2017 Tuesday**

- #23 AUTOMATED MONITORING OF THE UTILIZATION RATE OF ONSITE CONSTRUCTION EQUIPMENT  
Xiaoning Ren, Concordia University; Zhenhua Zhu\*, Concordia University; Chantale Germain, Hydro-Québec; Roger Belair, Hydro-Québec; Zhi Chen, Concordia University
  
- #184 POTENTIAL FOR USE OF CYBER-PHYSICAL SYSTEMS (CPS) FOR PLANNING AND OPERATION OF MOBILE CRANE ON CONSTRUCTION SITES  
Congwen Kan \*, University of Florida; Chimay Anumba, University of Florida, Gainesville; John Messner, Pennsylvania State University
  
- #215 VISION-BASED ACTIVITY ANALYSIS FRAMEWORK CONSIDERING INTERACTIVE OPERATION OF CONSTRUCTION EQUIPMENT  
Jinwoo Kim, Seoul National University; Seokho Chi\*, Seoul National University; Bon-Gang Hwang, National University of Singapore
  
- #242 PERSPECTIVE-BASED IMAGE-TO-BIM ALIGNMENT FOR AUTOMATED VISUAL DATA COLLECTION AND CONSTRUCTION PERFORMANCE MONITORING  
Khashayar Asadi Boroujeni\*, North Carolina State University; Kevin Han, North Carolina State University
  
- #267 TOWARDS LIGHT INTENSITY ASSISTED NON-INTRUSIVE ELECTRICITY DISAGGREGATION  
Jue Wang, Virginia Tech; Farrokh Jazizadeh\*, Virginia Tech
  
- #278 TOWARDS LIGHT INTENSITY ASSISTED NON-INTRUSIVE ELECTRICITY DISAGGREGATION  
Nazila Roofigari Esfahan\*, University of Florida; Shuming Du, McMaster University; Chimay Anumba, University of Florida, Gainesville; Saiedeh Razavi, McMaster University
  
- #313 ON THE SCALABILITY OF A LED-BASED INDOOR POSITIONING SYSTEM  
Milad Afzalan, Virginia Tech; Farrokh Jazizadeh\*, Virginia Tech

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**Session 4C (Modeling & Simulation): 10:15 – 12:00 on June 27, 2017 Tuesday**

- #18 MODELING THE EFFECT OF A SOCIO-PSYCHOLOGICAL PROCESS ON CONSTRUCTION WORKERS' SAFETY BEHAVIOR  
Byungjoo Choi\*, University of Michigan; SangHyun Lee, University of Michigan
- #165 BUILDING ACCESSIBILITY CODE COMPLIANCE VERIFICATION USING GAME SIMULATIONS IN VIRTUAL REALITY  
Abdullah Alghamdi\*, Western Michigan University; Mohammed Sulaiman, Western Michigan University; Abdulaziz Alghamdi, Western Michigan University; Mohammed Alhosan, Western Michigan University; Majid Mastali, Western Michigan University; Jiansong Zhang, Western Michigan University
- #241 INVESTIGATING THE IMPACT OF HUMAN RISK TAKING TENDENCY ON THE LIKELIHOOD OF STRUCK-BY ACCIDENTS IN CONSTRUCTION USING AGENT-BASED SIMULATION  
Cenfei Sun\*, University of Nebraska-Lincoln; Seungjun Ahn, University of South Australia; Changbum Ahn, University of Nebraska-Lincoln
- #209 STOCHASTIC FORECASTING OF UNKNOWN FUTURE PROJECT STREAMS FOR STRATEGIC PORTFOLIO PLANNING  
Alireza Shojaei\*, University of Florida; Ian Flood, University of Florida
- #220 AGENT-BASED SIMULATION FRAMEWORK FOR SUPPLY CHAIN MANAGEMENT OF LARGE-SCALE CONSTRUCTION PROJECTS  
Minhyuk Jung\*, Seoul National University
- #252 ROBUST OUTLIER DETECTION AND NORMAL ESTIMATION IN NOISY INFRASTRUCTURE 3D POINT CLOUDS  
Ali Khaloo\*, George Mason University; David Lattanzi, George Mason University
- #262 COMPARISON BASIS OF BUILDING INFORMATION MODELING WORKFLOWS FOR ENERGY ANALYSIS  
Pelin Gultekin-Bicer\*, Bradley University; Issa Ramaji, University of North Florida; Chimay Anumba, University of Florida, Gainesville

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**Session 4D (Safety + Modeling & Simulation): 10:15 – 12:00 on June 27, 2017 Tuesday**

- #45 EMS RESPONSE ACTIONS IN MASS CASUALTY INCIDENTS  
Chang-Chi Chou, National Taiwan University; Albert Chen\*, National Taiwan University
  
- #55 VIDEO-BASED INDOOR HUMAN DETECTION FOR DECISION-MAKING OF THE INSTALLATION LOCATIONS FOR AUTOMATED EXTERNAL DEFIBRILLATORS  
Albert Chen\*, National Taiwan University; Ching-Chun Chen, National Taiwan University
  
- #116 PARTITION PROBLEM FOR OPTIMIZING THE DEPLOYMENT OF INCIDENT RESPONSE  
Dai Zhi-You, National Taiwan University; Jihfu Kang, Northern Region Engineering Office, Taiwan Area National Freeway Bureau; Ning Li, Northern Region Engineering Office, Taiwan Area National Freeway Bureau; Likai Yang, HwaCom Systems Inc.; Yu-Ting Hsu\*, National Taiwan University
  
- #303 BUILDING SMART TRANSPORTATION HUBS WITH INTERNET OF THINGS TO IMPROVE SERVICES TO PEOPLE WITH SPECIAL NEEDS  
Jie gong\*, Rutgers University
  
- #315 A DATA INTEGRATION FRAMEWORK FOR URBAN SYSTEMS ANALYSIS BASED ON GEO-RELATIONSHIP LEARNING  
Zheng Yang\*, Stanford University; Karan Gupta, Stanford University; Archana Gupta, City of Palo Alto; Rishee Jain, Stanford University
  
- #87 IMAGING-TO-SIMULATION FRAMEWORK FOR IMPROVING DISASTER PREPAREDNESS OF CONSTRUCTION PROJECTS AND NEIGHBORING COMMUNITIES  
Youngjib Ham\*, Florida International University; Seung Jae Lee, Florida International University; Arindam Gan Chowdhury, Florida International University
  
- #115 FORMULATING THE MINIMUM NETWORK CLEARANCE TIME FOR EVACUATION PROBLEMS  
Yu-Ting Hsu\*, National Taiwan University; Hsiang-Yin Chen, National Taiwan University

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**Session 5A (BIM & CIM): 13:00 – 14:45 on June 27, 2017 Tuesday**

- #186 REFINEMENT OF THE VISUAL CODE CHECKING LANGUAGE FOR AN AUTOMATED CHECKING OF BUILDING INFORMATION MODELS REGARDING APPLICABLE REGULATIONS  
Cornelius Preidel\*, Technical University of Munich
  
- #191 SEMANTIC-RICH 3D CAD MODELS FOR BUILT ENVIRONMENTS FROM POINT CLOUDS: AN END-TO-END PROCEDURE  
Yeritza Perez-Perez\*, University of Illinois Urbana-Champaign; Mani Golparvar-Fard, University of Illinois at Urbana-Champaign; Khaled El-Rayes, University of Illinois at Urbana-Champaign
  
- #208 IMPROVING RSSI-BASED INDOOR LOCALIZATION PERFORMANCE BY INTEGRATING BIM  
Hainan Chen, City University of Hong Kong; Xiaowei Luo\*, City University of Hong Kong; Jian Guo, Hong Kong Polytechnic University
  
- #259 A COMPREHENSIVE IDENTIFICATION AND CATEGORISATION OF DRIVERS, FACTORS AND DETERMINANTS FOR BIM ADOPTION: A SYSTEMATIC LITERATURE REVIEW  
Ahmed Ahmed\*, University of Sheffield; Mohamad Kassem, Northumbria University; John Kawalek, University of Sheffield
  
- #297 BIM-INTEGRATED SYSTEM FOR AUTOMATED VALUE ANALYSIS OF BUILDINGS  
Lu Zhang\*, Florida International University; Nora El-Gohary, University of Illinois at Urbana-Champaign
  
- #309 KEYWORD-DRIVEN MODEL VIEW GENERATION FOR CIVIL INFRASTRUCTURE PROJECTS  
Tuyen Le\*, Iowa State University; H. David Jeong, Iowa State University
  
- #317 BIM-BASED CONSTRUCTION NOISE HAZARD PREDICTION AND VISUALIZATION FOR OCCUPATIONAL SAFETY AND HEALTH AWARENESS IMPROVEMENT  
Weile Wei, Louisiana State University; Chao Wang\*, Louisiana State University; Yongcheol Lee, Louisiana State University

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**Session 5B (Construction Management): 13:00 – 14:45 on June 27, 2017 Tuesday**

- #84 PERFORMANCE ANALYSIS OF A PROBABILISTIC LOCAL SEARCH ALGORITHM FOR INDOOR TRACKING  
Jee Woong Park\*, Georgia Tech; Yong Cho, Georgia Tech
- #231 CONSTRUCTION WORK PLAN PREDICTION FOR FACILITY MANAGEMENT USING TEXT MINING  
Yunjeong Mo\*, Michigan State University; Dong Zhao, Michigan State University; Matt Syal, Michigan State University; Azizan Aziz, Carnegie Mellon University
- #121 HARDWARE AND SOFTWARE REQUIREMENTS FOR ACOUSTICAL MODELING OF CONSTRUCTION JOBSITES  
Chieh-Feng Cheng, Georgia Tech; Abbas Rashidi\*, Georgia Southern University; Mark Davenport, Georgia Tech; David Anderson, Georgia Tech; Chris Sabillon, Georgia Southern University
- #123 DECISION SUPPORT FOR TEST TRENCH LOCATION SELECTION WITH 3D SEMANTIC SUBSURFACE UTILITY MODELS  
Paulina Racz, University of Twente; Lars Syfuss, University of Muenster; Carl Schultz\*, University of Muenster; Léon olde Scholtenhuis, University Twente; Faridaddin Vahdatikhaki, University of Twente; Marc van Buiten, University of Twente; Andrée Dorée, University of Twente
- #257 MODEL-DRIVEN VISUAL DATA CAPTURE ON CONSTRUCTION SITES: METHOD AND METRICS OF SUCCESS  
Amir Ibrahim\*, University of Illinois at Urbana-Champaign; Mani Golparvar-Fard, University of Illinois at Urbana-Champaign; Timothy Bretl, University of Illinois at Urbana-Champaign; Khaled El-Rayes, University of Illinois at Urbana-Champaign
- #261 DEVELOPING A SATISFACTORY INPUT FOR PROJECT COMPLEXITY MODEL USING PRINCIPAL COMPONENT ANALYSIS (PCA)  
Bac Dao\*, Univ. of Nebraska Lincoln; Behzad Esmaili, Univ. of Nebraska-Lincoln; Stuart Anderson, Texas A&M Univ.
- #268 POTENTIAL OF CONVOLUTIONAL NEURAL NETWORK-BASED 2D HUMAN POSE ESTIMATION FOR ON-SITE ACTIVITY ANALYSIS OF CONSTRUCTION WORKERS  
Meiyin Liu\*, University of Michigan; SangUk Han, Hanyang University; SangHyun Lee, University of Michigan

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**Session 5C (Energy, Sustainability and Resilience): 13:00 – 14:45 on June 27, 2017 Tuesday**

- #207 RESILIENCE STRATEGIES FOR INTERDEPENDENT MULTISCALE LIFELINE INFRASTRUCTURE NETWORKS  
Lina Sela\*, The University of Texas at Austin, TX; Udit Bhatia, Northeastern University, Boston, MA; Janice Zhuang, University of Texas, Austin, TX; Auroop R. Ganguly, Northeastern University, Boston, MA
- #213 LATENT RELATIONSHIP BETWEEN CONSTRUCTION COST TAKEOFFS AND ENERGY EFFICIENCY IN MULTIFAMILY GREEN BUILDINGS  
Yunjeong Mo, Michigan State University; Dong Zhao\*, Michigan State University; Andrew McCoy, Virginia Tech; Jing Du, Texas A&M University; Philip Agee, Virginia Tech
- #251 SIMULATION-BASED OPTIMIZATION OF BUILDING RENOVATION CONSIDERING ENERGY CONSUMPTION AND LIFE-CYCLE ASSESSMENT  
Seyed Amirhosain Sharif Arani, Concordia University; Amin Hammad\*, Concordia University
- #266 AN ONTOLOGY TO SUPPORT THE MOVE TOWARDS SUSTAINABLE CONSTRUCTION IN SAUDI ARABIA  
Abdulmajeed Howsawi\*, Western Michigan University; Jiansong Zhang, Western Michigan University
- #274 MAPPING WIND ENERGY POTENTIAL IN NEW YORK CITY USING GEOGRAPHIC INFORMATION SYSTEM PLATFORM AND SEMI-ANALYTICAL METHODS  
Samaneh Gholitabar\*, New York University
- #284 NON-INTRUSIVE DETECTION OF RESPIRATION FOR SMART CONTROL IN HVAC SYSTEM  
Wooyoung Jung, Virginia Tech; Farrokh Jazizadeh\*, Virginia Tech
- #314 MULTI-SCALE MODELING OF A 500-YEAR CSZ TSUNAMI INUNDATION WITH CONSTRUCTED ENVIRONMENT  
Xinsheng Qin\*, University of Washington; Michael Motley, University of Washington; Randall LeVeque, University of Washington; Frank Gonzalez, University of Washington

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**Session 5D (Project Planning and Control): 13:00 – 14:45 on June 27, 2017 Tuesday**

- #13 SOUND RECOGNITION TECHNIQUES FOR MULTI-LAYERED CONSTRUCTION ACTIVITIES AND EVENTS  
Chunhee Cho, Georgia Institute of Technology; Yongcheol Lee\*, Louisiana State University; Tianyi Zhang, Louisiana State University
  
- #19 ARCHITECTURAL FREEDOM IN SPITE OF PRECAST ELEMENTS  
Katharina Klemt-Albert, Leibniz Universität Hannover; Philipp Hagedorn\*, Leibniz Universität Hannover; Torben Pullmann, albert.ing GmbH; Matthias Bergmann, albert.ing GmbH
  
- #91 3D THERMAL AND SPATIAL MODELING OF A SUBWAY TUNNEL: A CASE STUDY  
Ghassan Al Lafi\*, Concordia University; Zhenhua Zhu, Concordia University
  
- #206 AEC PROJECT PERFORMANCE PREDICTION AND VALIDATION USING THE ARTIFICIAL NEURAL NETWORK  
Ivan Leung\*, Stanford University; Calvin Kam, Stanford University; Min Song, Stanford University
  
- #222 SENSOR-BASED RESOURCE TRACKING FOR MONITORING THE PROGRESS OF REBAR INSTALLATION  
Gursans Guven\*, Ozyegin University; Esin Ergen, Istanbul Technical University
  
- #270 AUTOMATION OF PROJECT PLANNING AND RESOURCE SCHEDULING ON A ROUGH GRADING PROJECT  
Duanshun Li\*, University of Alberta; Chaojue Yi, University of Alberta; Ming Lu, University of Alberta
  
- #282 ERROR QUANTIFICATION AND VISUALIZATION IN USING SENSORS TO POSITION BACKHOE EXCAVATOR  
Ming Lu\*, University of Alberta; Monjurul Hasan, University of Alberta, Canada

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**Session 6A (BIM & CIM): 15:00 – 16:45 on June 27, 2017 Tuesday**

- #179 INVESTIGATING BUILDING SUSTAINABILITY BY APPLYING SENSITIVITY ANALYSIS OF IMPACT FACTORS DURING DESIGN STAGE  
Cheng Zhang\*, Xi'an Jiaotong-Liverpool University; Lijing Ong, Xi'an Jiaotong-Liverpool University
- #193 IMAGERY-BASED RISK ASSESSMENT USING CROWDSOURCING TECHNOLOGY IN COMPLEX CONSTRUCTION SITES  
Cheng Zhang, Arizona State University; Pingbo Tang\*, Arizona State University; Pin-Chao Liao, Tsinghua University; Yi Ren, Arizona State University
- #194 INVESTIGATION OF LEVERAGING BIM STANDARDS TO FACILITATE SUSTAINABILITY EVALUATIONS FROM EARLY STAGE OF DESIGN  
Issa Ramaji\*, University of North Florida; Pelin Gultekin-Bicer, Bradley University; Raphael Crowley, University of North Florida; David Lambert, University of North Florida
- #224 FRAMEWORK OF DYNAMIC DAILY 4D BIM FOR TRACKING CONSTRUCTION PROGRESS THROUGH A WEB ENVIRONMENT  
Jaehyun Park\*, Purdue University; Hubo Cai, Purdue University
- #245 BENEFITS OF REAL-TIME DATA DRIVEN BIM FOR FM DEPARTMENTS IN OPERATIONS CONTROL AND MAINTENANCE  
Omid Davtalab\*, University of Southern California
- #246 EXPLORING THE BODY OF KNOWLEDGE FOR BUILDING INFORMATION MODELING IMPLEMENTATION USING THE DELPHI METHOD  
Wei Wu\*, California State University, Fresno; Glenda Mayo, University of North Carolina at Charlotte; Ray Issa, University of Florida; Tammy McCuen, University of Oklahoma; Deke Smith, bimSMARTfoundation
- #290 AN AUTOMATED RECONSTRUCTION APPROACH OF MECHANICAL SYSTEMS IN BUILDING INFORMATION MODELING (BIM) USING 2D DRAWINGS  
CHI YON CHO\*, Carnegie Mellon University; Xuesong Liu, Carnegie Mellon University

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**Session 6B (Education): 15:00 – 16:45 on June 27, 2017 Tuesday**

- #9 WHEN IS A CONSTRUCTION EDUCATIONAL SERIOUS GAME TOO SERIOUS? STRIKING A BALANCE BETWEEN ENGAGEMENT AND LEARNING  
Fadi Castronovo\*, California State University East Bay; Robert Leicht, Pennsylvania State University; John Messner, Pennsylvania State University
- #138 LEARNING ADVANCED DECISION-MAKING TECHNIQUES AND TECHNOLOGIES THROUGH A COLLABORATIVE PROJECT  
Seokyon Hwang\*, Lamar University; Mahdi Safa, Lamar University
- #150 ICT-ENABLED CROSS-CULTURAL EDUCATION IN SUSTAINABLE URBANIZATION  
Nan Li\*, Tsinghua University; Deland Chan, Stanford University; Kevin Hsu, Stanford University; Zhiyong Fu, Tsinghua University; Quan Mao, Tsinghua University
- #153 A MIXED REALITY ENVIRONMENT FOR STUDENTS' LEARNING OF STEEL CONNECTION BEHAVIOR  
Hazar Dib\*, Purdue University; Nicoletta Adamo-Villani, Purdue University
- #205 A NEW LEARNING MODEL, GUIDED SOFT CLASSROOM, INTEGRATING MOOCS INTO CONVENTIONAL CLASSROOMS FOR UNIVERSITY STUDENTS  
Yi-Fen Li\*, National Taiwan University; Ching-Mei Tseng, National Chi Nan University; Shih-Chung Kang, National Taiwan University
- #329 HYBRID REAL/VIRTUAL SIMULATION IN AN ENGINEERING LABORATORY COURSE  
Yupeng Luo\*, California State University, Fresno; Jeevjyot Chhabda, California State University, Fresno

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**Session 6C (Design Management and Collaboration): 15:00 – 16:45 on June 27, 2017 Tuesday**

- #70 SIMULTANEOUS DATA EXCHANGE BETWEEN BIM AND VR FOR COLLABORATIVE DECISION-MAKING  
Jing Du\*, Texas A&M University; Zhengbo Zou, Texas A&M University; Yangming Shi, Texas A&M University; Dong Zhao, Michigan State University
- #86 THE NEED FOR TAXONOMIES IN THE ONTOLOGICAL APPROACH FOR INTEROPERABILITY OF HETEROGENEOUS INFORMATION MODELS  
Aaron Costin\*, University of Florida; Charles Eastman, Georgia Institute of Technology; Ray Issa, University of Florida
- #96 DEVELOPMENT OF AN OCCUPANT-CENTERED INTEGRATED LIGHTING AND SHADING CONTROL FOR ENERGY SAVING AND INDIVIDUAL PREFERENCES  
Ting-Chun Kuo, National Taiwan University; Ying-Chieh Chan\*, National Taiwan University; Albert Chen, National Taiwan University
- #105 USING DATA DRIVEN METHODOLOGIES TO IDENTIFY PATTERNS IN BAS DATA TO SUPPORT FACILITY OPERATIONS  
Gokmen Dedemen, New York University; Marjan Vakilinezhad, New York University; Semiha Ergan\*, NYU
- #240 HYBRIDIZING TOPOLOGY OPTIMIZATION AND EVOLUTIONARY COMPUTATION TO SUPPORT COMPUTER-AIDED ENGINEERING DESIGN  
Achyuthan Jootoo\*, George Mason University; David Lattanzi, George Mason University
- #271 EFFECTS OF PHYSICAL DISORDERS IN NEIGHBORHOODS ON PEDESTRIANS' PHYSIOLOGICAL RESPONSES  
Mohammad Bisadi\*, University of Nebraska-Lincoln; Hyunsoo Kim, University of Nebraska-Lincoln; Changbum Ahn, University of Nebraska-Lincoln; Yunwoo Nam, University of Nebraska-Lincoln
- #102 STOCHASTIC OPTIMIZATION MODEL FOR SUSTAINABLE WATER TREATMENT WITH MINIMAL ENERGY USE  
Jacob Blackwood, Pennsylvania State University; Ebrahim Karan\*, Millersville University; Somayeh Asadi, Pennsylvania State University; Atefeh Mohammadpour, Indiana University–Purdue University Fort Wayne ; Sadegh Asgari, Merrimack College

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**Session 6D (Intelligent Sensing & Monitoring): 15:00 – 16:45 on June 27, 2017 Tuesday**

- #37 VISUAL AWARENESS ON SURFACE FLOW MEASUREMENT  
Yao-Yu Yang\*, National Taiwan University; Shih-Chung Kang, National Taiwan University
  
- #63 FIELD MEASUREMENT OF CONSTRUCTION WORKERS' VALENCE USING A WEARABLE EEG DEVICE  
Houtan Jebelli\*, University of Michigan; Sungjoo Hwang, Ewha Womans University; SangHyun Lee, University of Michigan
  
- #129 POST-SIMULATION VISUALIZATION OF CONSTRUCTION MANUAL OPERATIONS USING MOTION CAPTURE DATA  
Alireza Golabchi\*, University of Alberta; SangUk Han, Hanyang University; Simaan AbouRizk, University of Alberta
  
- #199 A COMPACT AND VERSATILE WIRELESS SENSOR PROTOTYPE FOR AFFORDABLE INTELLIGENT SENSING AND MONITORING IN SMART BUILDINGS  
Qian Huang\*, Southern Illinois University Carbondale; Chen Mao, Southern Illinois University Carbondale; Yunfeng Chen, Georgia Southern University
  
- #200 THE IMPACT OF ENGINEERING INFORMATION FORMATS ON CRAFT WORKER EYE GAZE PATTERNS  
Omar Alruwaythi\*, University of Colorado at Boulder; Matthew Sears, University of Colorado at Boulder; Paul Goodrum, University of Colorado at Boulder
  
- #247 TOWARDS AN OCCUPANCY-ENHANCED BUILDING HVAC CONTROL STRATEGY USING WI-FI PROBE REQUEST INFORMATION  
Xuan Li\*, Carnegie Mellon University; Xuesong Liu, Carnegie Mellon University; Zhen Qian, Carnegie Mellon University
  
- #273 A REAL-TIME EMERGENCY EVACUATION MANAGEMENT SYSTEM (REEMS) USING INDOOR LOCALIZATION TECHNOLOGY  
Faxi Yuan, University of Florida; Rui Liu\*, University of Florida

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