



# **CI & CRC Joint Conference 2022**

***Next Generation Construction***

**March 9-12, 2022**

**Arlington, VA**

**CRC Technical Program**

**Track Schedule**

**Final Version – February 28, 2022**

**<https://cisummit-crc.asce.org/>**

# CRC Workshops/Committee Meetings

## Wednesday

3:00-5:00pm	CIT-E Workshop	Roosevelt Room
3:30-5:00pm	Creating and Fostering Inclusive Academic Communities Workshop	Tidewater 2 Room
7:00-9:00pm	JCEM Editorial Board Meeting	Jefferson Room

## Thursday

8:00-9:00am	JCEM Sustainable Practices & Special Issue Workshop	Roosevelt Room
9:00-11:00am	CRC Business Meeting	Washington AB

**Thursday March 10, 2022**  
**Session 1: 1:00 pm - 2:00 pm**

**Track 1: Construction Education**

Track Chair: Manideep Tummalapudi

	CED-10	Correlation Between Brain Cognitive Response And On-Line Questionnaire During A Construction Safety Training In Virtual Reality	Krishna Kisi, Tulio Sulbaran
Room:	CED-14	VROnSite: Online Site Visits Using Web-Based Virtual Environments	Ricardo Eiris, Yuan Sun, Masoud Gheisari, Brent Marsh, Pasi Lautala
Potomac 1	CED-22	Conversational Virtual Humans On 360-Degree Virtual Sites: Guiding Students On A Site Visit To A Mechanical Room	Jing Wen, Masoud Gheisari
	CED-32	Use Of Virtual Site Visits In Construction Management Distance Education	Alireza Shojaei, Amirsaman Mahdavian, Saeed Rokoei, Ahmed Al-Bayati

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Ifeanyi Okpala

	HSW-29	Risk Assessment For Using UAS In Construction: A Fuzzy Analytical Hierarchy Process	Yiye Xu, Yelda Turkan
Room:	HSW-31	Safety Culture Element System And Its Management Mechanism Analysis In Construction Projects	Yuecheng Huang, Zhihui Zhang
Potomac 2	HSW-32	Comprehensive Analysis On The Effectiveness Of The Multiskilling Strategy Among Craft Professionals	Rakan K Albalawi, Paul M. Goodrum, Tim Taylor, Kevin Real, Mohammed A. Albattah
	HSW-33	Assessing Lower Extremity Kinematics Of Roofing Tasks	Matin Jahani Jirsaraei, Behzad Esmaeili, Parth Pathak

**Track 3: Automation in Construction**

Track Chair: Tuyen (Robert) Le

	AIC-08	Evaluating The Perception Of Human-Robot Collaboration Among Construction Project Managers	Mahya Sam, Bryan Franz, Edward Seh-Taylor, Christopher Mccarty
Room:	AIC-10	Human Robot Comparison In Rapid Structural Inspection	Pengxiang Xia, Fang Xu, Qi Zhu, Jing Du
Potomac 3	AIC-11	Human Intent Prediction In Human-Robot Collaboration: A Pipe Maintenance Example	Tianyu Zhou, Yubo Wang, Jing Du
	AIC-17	Toward Human-In-The-Loop Construction Robotics: Understanding Workers' Response Through Trust Measurement During Human-Robot Collaboration	Shayan Shayesteh, Houtan Jebelli

**Track 4: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Bethany Gordon

	ISR-06	Economic Viability Of Solar Panels For Single Family Homes	Pramen Prasad Shrestha, Mythili Pragada
Room:	ISR-98	Economics Of Energy Efficient Electrical Appliances Used In Residential Buildings In The U.S.	Mohamed Abdel-Raheem, Miranda Garcia, Mark Hernandez, Shaun Morin
Potomac 4	ISR-114	Preliminary Analysis Of Environmental Focus Roofing Strategies In Colorado's Front Range Region	Joe Oakman, Rodolfo Valdes-Vasquez
	ISR-112	Understanding How Green Contractors Displayed Social Sustainability Actions Due to the BLM Movement in 2020	Rodolfo Valdes-Vasquez, Deniz Besiktepe

**Track 5: Health, Safety, and Workforce Issues**

Track Chair: Gilles Albeaino

	HSW-43	Construction Safety Training Interventions: State Of The Science And Future Opportunities	Abdullah Alsharef, S. M. Jamil Uddin, Alex Albert, Siddharth Bhandari, Edward Jaselskis
Room:	HSW-68	Evaluation Of Construction Workers' Emotional States During Virtual Reality-Based Safety Training	Kwonsik Song, Gaang Lee, SangUk Han, SangHyun Lee
Potomac 5	HSW-05	Are Multimedia Training Interventions Effective Within Traditional Safety Training Frameworks?	Sreeja Thallapureddy, Siddharth Bhandari, Alex Albert
	HSW-64	Role Of Safety Training In Reducing Fatigue Among Construction Workers	Mostafa Namian, Ahmed Al_Bayati, Chukwuma Nnaji

**Track 6: Contracting, Project Delivery, and Legal Issues**

Track Chair: Hala Sanboskani

	CDL-04	Sharing Risk Contingency Costs In Construction Joint Venture Agreements: A Cooperative Game Theory Approach	Radwa Eissa, Yasmeim Shahin, Mohamed S. Eid
Room:	CDL-14	Major Causes Of Claims And Disputes On Transportation Public-Private-Partnership Projects	Omar Shabana, Ghada M. Gad
Potomac 6	CDL-42	Management And Contract Allocation Of Geotechnical Risks On Mega Design-Build Infrastructure Projects	Hajer Dawoody, Ghada Gad
	CDL-54	Selection Factors For Progressive Design-Build Delivery Method	Behzad Esmaeili, Ruqaya Alameri

**Thursday March 10, 2022**  
**Session 1: 1:00 pm - 2:00 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Hani Alzraiee

	CAS-02	Framework For Simulating Crew Motivation Impact On Productivity: A Hybrid Modeling Approach	Nebiyu Kedir, Mohammad Raoufi, Aminah Robinson Fayek
Room:	CAS-56	Use Of Digital Human Modeling For Estimating Physiological Workloads Of Construction Tasks	Lynn Shehab, Hiam Khoury, Saif Al-Qaisi
Arlington	CAS-63	Optimization Of Labor Flow Efficiency In Steel Fabrication Project Planning	Leila Zahedi, Ming Lu
	CAS-72	A BIM-Enabled Dashboard System For Construction Project Monitoring And Control	Veerasak Likhitruangsilp, Photios G. Ioannou, Pimpisut Nantapanuwat

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Mani Golparvar

	ADT-30	Virtual Reality And Construction Industry: Review Of Current State-Of-Practice And Future Applications	Jazmin Lopez, Siddharth Bhandari, Matthew Hallowell
Room:	ADT-39	Worker-Aware Robotic Motion Planner In Construction For Improved Psychological Well-Being During Worker-Robot Interaction	Yizhi Liu, Houtan Jebelli
Fairfax	ADT-50	Developing A Comprehensive 3D Point Cloud Dataset For Construction Projects	Hong Huang, Cheng Zhang, Lei Fan
	ADT-72	A System-Of-Systems Framework Of Data Analytics To Support Strategic Decision-Making In The Construction Industry	Navid Nickdoost, Juyeong Choi, Yassir Abdelrazig

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Shantanu Kumar

	ISR-54	Empirical Analysis Of Factors Associated With Financial Loss Due To Hurricane Harvey	Frederick Chung, Baabak Ashuri
Room:	ISR-41	Evaluation Of Safe-To-Fail Criteria For Coastal City	Rubaya Rahat, Mohamed Elzomor, Piyush Pradhananga
Prince William	ISR-116	The Impact Of Natural Disaster Affected Housing Service Sector On The Interrelated Industries	KwangHyuk Im
	ISR-124	Natural Disasters, Inequality, And Civil Infrastructure Systems: A Social Sensing Approach For Identifying Socioeconomic And Physical Vulnerabilities	Mostafa Batouli, Deepti Joshi

**Thursday March 10, 2022**  
**Session 2: 2:30 pm - 3:30 pm**

**Track 1: Construction Education**

Track Chair: Karen Gupta

Room: Potmac 1	CED-16 Evaluating The Effectiveness Of Extracurricular Online Workshops On Student Learning In Construction	Yewande Sonayon Abraham, Bilge Gakhan Äelik, Max Frasier Spaan, Natalie Mansson
	CED-40 Learning Factory For Construction To Provide Future Engineering Skills Beyond Technical Education And Training	Jochen Teizer, Christos Chronopoulos
	CED-01 Integration Of Virtual Technology As A Pedagogical Tool In Construction Knowledge Transfer	Ramyani Sengupta, Anthony E. Sparkling
	CED-02 Developing Context And Practice-Based Curricula In Construction Engineering And Management	Diana Marcela Franco Duran

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Nihar J. Gonsalves

Room: Potomac 2	HSW-71 Do OSHA 10/30-Hour Training Programs Revamp The Safety Attitudes Of Construction Workers?	Mostafa Namian, Mohammadsoroush Tafazzoli, Sharareh Kermanshachi, Yilei Huang
	HSW-59 Working Safely With Drones: A Virtual Training Environment For Workers On Heights	Idris Jeelani, Masoud Gheisari, Eduardo Mendes, Gilles Albeaino, Patrick Brophy
	HSW-65 Enhancing Workers' Vigilance To Electrical Hazards Through A Virtually Simulated Accident	Namgyun Kim, Changbum Ryan Ahn, Austin Miller, Robert Dibello, Daniel Lobello, Somyung Oh, Ann McNamara
	HSW-75 Impact Of Hazard State On Construction Workers Safety Risk Assessment	Abdullahi Ibrahim, Chukwuma Nnaji, Mahmoud Shakouri, Mostafa Namian

**Track 3: Automation in Construction**

Track Chair: Doyun Lee

Room: Potomac 3	AIC-26 Exploring The Use Of Mobile Technologies For Highway Construction Inspection	Mamdouh Mohamed, Dan Tran
	AIC-33 Automated Visual Inspection Planning For Prefabricated Modules With 3D Laser Scanning	Rachel Hyo Son, Kevin Han
	AIC-34 Automated Vision-Based Building Energy Assessment Using Drone Thermography	Shayan Mirzabeigi, Mohamad Razkenari

**Track 4: Project and Organizational Management and Planning**

Track Chair: Vartenie Aramali

Room: Potomac 4	PMP-11 Barriers & Motivators Of Knowledge Sharing In A Virtual Engineering Office	Marilyn Karam, Hala Sanboskani, Daoud Kiomjian, Issam Srour
	PMP-71 Review Of Current Practices To Implement Organization-Wide Knowledge Repositories	Siddharth Banerjee, Abdullah Alsharaf, Edward Jaselskis, Kalyan Piratla
	PMP-38 The Effect Of The Economic And Social Motivations On Knowledge Sharing Behavior In Megaprojects: A Mediating Effect Of Environmental Dynamism	Hui He, Qinghua He, Ge Wang, Xiaoxue Liu, Jun Zhu
	PMP-27 Understanding Organizational Improvisation In Construction Megaprojects	Kaiwen Jiang, Yun Le, Xian Zheng, Xinyue Zhang

**Track 5: Computer Applications, Information Modeling, and Simulation**

Track Chair: Fang Xu

Room: Potomac 5	CAS-68 Automated Prioritization Of Requirements To Support Risk-Based Construction Inspection Of Highway Projects Using LSTM Neural Network	Tuyen Le, Fahad Ul Hassan
	CAS-71 Applicability Of Artificial Intelligence (AI) Methods To Construction Manufacturing: A Literature Review	Mohsen Hatami, Suman Paneru, Ian Flood
	CAS-75 Analyzing Passenger Flow Lines And Optimizing The Facility Layout Management For Cairo Metro Elevated Stations	Helen Saher Ghali, Khalid Nassar, Yasmeen Essawy, Abdelhamid Abdullah
	CAS-76 Simulation Of An Earth Embankment Dam In Adverse Rainy Weather	Haidy Saher Ghali, Khalid Nassar, Yasmeen Essawy, Abdelhamid Abdullah

**Track 6: Contracting, Project Delivery, and Legal Issues**

Track Chair: Krishna Kisi

Room: Potomac 6	CDL-02 Precontract Negotiations In Design-Build Projects	Elif Deniz Oguz Erkal, Keith Molenaar
	CDL-19 Current State Of Practice In Selection And Implementation Of Airport Capital Project Delivery Methods	Phuong H.D. Nguyen, Daniel Tran
	CDL-05 Project Performance Comparison Of Vertical Projects Versus Horizontal Projects	Pramen Prasad Shrestha, Elina Prajapati
	CDL-07 Impacts Of Alternative Contracting Methods For Utility Coordination Of Transportation Projects	Tarig A. Omer, Roy Sturgill, Timothy Taylor

**Thursday March 10, 2022**  
**Session 2: 2:30 pm - 3:30 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Qi (Judy) Zhu

Room: Arlington	CAS-09 A Framework For BIM, BAS, And IOT Data Exchange Using Semantic Web Technologies	Shu Tang, Cheng Zhang, Jianli Hao, Fangyu Guo
	CAS-06 Identifying Prevailing Research Topics In Facility Maintenance Information And XR Visualization Via Text Mining	Daniel Weeks, Fernanda Leite
	CAS-43 A BIM Information Processing Framework To Facilitate Enriched BIM Applications	Ran Ren, Jiansong Zhang, Yunfeng Chen, Hazar Nicholas Dib
	CAS-44 Digital Twin Aided Healthcare Facility Management: A Case Study Of Shanghai Tongji Hospital	Ying Song, Yongkui Li

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Hani Alzraiee

Room: Fairfax	ADT-06 Designing An Automated Multi-Objective Optimization Model For Integrated And Sustainable Farming	Ossama Hosny, Elkhayam Dorra, Ahmed El-Eslamboly, Khaled Tarabieh, Ibrahim Abotaleb, Mariam Amer, Mostafa Farouk, Heba Gad, Youmna Abd El Raouf, Adham Sherif, Youssef Hussien
	ADT-07 State-Of-The-Practice Of Big Data In Decision Making Processes Within The Construction Industry	Joao Victor Stedile Zolin, Katherine Maslak Madson
	ADT-43 Measuring The Impact Of Information Display Methods On Ar Hmd For Comprehending Construction Information With EEG	Yimin Qin, Tanyel Bulbul
	ADT-66 An Investigation Of Visualization Technologies For Remote Work In The Architecture, Engineering And Construction Industry	Oluwatobiloba Samuel Sowunmi, Lingguang Song, Randi Scheiber, Zia Din Ud

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Shantanu Kumar

Room: Prince William	ISR-52 Socioeconomic And Housing Vulnerability's Role To Decision Time For Reconstruction In Puerto Rico After Hurricane Maria	Tonmoy Sarker, Cristina Poleacovschi, Ivis Garcia Zambrana, Carl F. Weems, Kaoru Ikuma, Chris Rehmann
	ISR-20 Knowledge And Perception Of Single-Family Residential Building Resilience And Its Impact On Disaster Evacuations Decisions	Giovanna Fusco, Jin Zhu
	ISR-28 Integrating Social Equity And Vulnerability With Infrastructure Resilience Assessment	Sunil Dhakal, Lu Zhang
	ISR-35 Vulnerability Of Southwest Florida Water Infrastructure Under The Impacts Of Hurricane	Long D. Nguyen, Seneshaw Tsegaye

**Thursday March 10, 2022**  
**Session 3: 4:00 pm - 5:15 pm**

**Track 1: Construction Education**

Track Chair: Krishna Kisi

Room: Potomac 1	CED-09	Integrating Front-End Planning And Infrastructure Sustainability In Construction Education Through Problem-Based Learning	Valentina Ferrer, Mohamed Elzomor, Rubaya Rahat, Piyush Pradhananga
	CED-12	A Network-Based Approach To Understand Potentials For On-The-Job Training In Construction Professions	Xi Chen, Mohammad Ilbeigi
	CED-13	Unmanned Aircraft Vehicles In Construction And Engineering Higher Education Programs	Christofer M. Harper, Mohammed Mehany, Manish Parajuli
	CED-21	Improving BIM Integration And Implementation In Construction Education	Siyuan Song, Mohammad Ammar Alzarrad, Sungjin Kim
	CED-30	Students Perception Of Instructional Delivery Methods Utilizing Various Teaching Modalities In An Integrated Construction Management Curriculum	Joseph Cleary, Stacy Kolegraff, Andrew Kline

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Ibukun Awolusi

Room: Potomac 2	HSW-80	Health And Safety Of Construction Field Workforce Active In Extreme Weather Conditions	Sanjgna Karthick, Sharareh Kermanshachi, Issa Ramaji
	HSW-82	Utility Of Wearable Sensing Devices For Environmental Monitoring On Construction Sites	Ibukun Awolusi, Antonio Martinez-Molina, Chukwuma Nnaji, Miltiadis Alamaniotis, Tulio Sulbaran
	HSW-83	Effect Of Time Pressure And Cognitive Demand On Line Workers' Risk-Taking Behaviors: Assessment Of Neuro-Psychophysiological Responses In A Mixed-Reality Environment	Shiva Pooladvand, Beyza Kiper, Aditya Mane, Sogand Hasanzadeh
	HSW-88	Safety Innovation Adoption In Construction: Role Of Safety Compliance And Safety Attitude	Tolulope Sanni, Chukwuma Nnaji, Ibukun Awolusi, Ahmed Al-Bayati
	HSW-57	The Construction Industry from the Perspective of the Worker's Social Experience	Bassam Ramadan, Tim R.B. Taylor, Kevin J. Real, Paul Goodrum

**Track 3: Automation in Construction**

Track Chair: K. Joseph Shrestha

Room: Potomac 3	AIC-02	A Goal-Oriented Framework For Implementing Change In Off-Site Construction In The Industry 4.0 Era	Fatima Alsakka, Farook Hamzeh, Mohamed Al-Hussein, Haitao Yu
	AIC-09	Exoskeleton Training Through Haptic Sensation Transfer In Immersive Virtual Environment	Yang Ye, Yangming Shi, Jing Du, Youngjae Lee, Garret Burks, Divya Srinivasan
	AIC-13	Real-Time And Automatic Detection Of Welding Joints Using Deep Learning	Doyun Lee, Guang-Yu Nie, Kevin Han

**Track 4: Project and Organizational Management and Planning**

Track Chair: Yoojung Yoon

Room: Potomac 4	PMP-06	Identifying Multilevel Metrics For Construction Competency And Performance Measures	Yisshak Tadesse Gebretেকে, Aminah Robinson Fayek
	PMP-13	Exploring Trends In Risk Statements Among Design And Construction Of Scientific Research Facility Projects	Evan Dicks, Keith Molenaar
	PMP-05	POP: A Data-Based Construction Project Overall Performance Model	Hiba Jalloul, Awad S. Hanna, Wafik Lotfallah
	PMP-20	Collaborative Planning Metrics In Construction Projects: A Factor Analysis Approach	Amr El-Sayegh, Islam El-Adaway
	PMP-46	New Heuristic Method Of Section Network Compression Process For Large-Scale Networks	Silas Stewart, Yoojung Yoon

**Track 5: Engineering and Materials Design, Quality, and Value Management**

Track Chair: Xi Wang

Room: Potomac 5	EQV-15	Streamlining Well Concepts Of Office Buildings For Developing Countries: The Case Of Malaysia	Carmen Y. M. Tan, Rahimi A. Rahman, Bo Xia, Qing Chen
	EQV-20	Upstream Digitized Materials Tracking By Vendors And Suppliers: Barriers, Drivers, And Benefits	Verena Schneider, David Grau
	EQV-25	Strategies For Enhancing Construction Waste Recycling: A Fuzzy Synthetic Evaluation	Rahimi A. Rahman, Mazen M. A. Omer, Saud Almutairi
	EQV-21	Multi-Objective Optimization Model To Minimize Upgrade And Utility Costs Of Large Existing Buildings	Mahdi Ghafoori, Moatassem Abdallah
	EQV-08	Unveiling Value Creation In Megaprojects From The Perspective Of Stakeholder Value Network	Ouyang Luxia, Zheng Xian, Li Yongkui, Pang Bo, Gao Xinglin

**Track 6: Contracting, Project Delivery, and Legal Issues**

Track Chair: Krishna Kisi

Room: Potomac 6	CDL-13	Longitudinal Study Of Information Management In University Construction Contracts	Amelia Celozza, Daniel P. De Oliveira, Fernanda Leite
	CDL-15	Leveraging Alternative Technical Concept For Contract Delivery Of Accelerated Bridge Construction	Piyush Pradhananga, Mohamed Elzomor
	CDL-21	Dimensions Of Innovation In Project Delivery Method Selection For Highway Projects	Vassiliki Demetrapoulou, William O'Brien, Nabeel Khwaja
	CDL-27	State-Of-The-Art Review On The Applicability Of Natural Language Processing (NLP) Methods To Address Legal Issues In Construction	Fahad Ul Hassan, Tuyen Le
	CDL-03	Fairly Apportioning Concurrent Delay Liability: A Game Theory Approach	Huu Trong Huynh, Gunnar Lucko, Mohamed S. Eid

**Thursday March 10, 2022**  
**Session 3: 4:00 pm - 5:15 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Amirhosein Jafari

Room: Arlington	CAS-14	Model Requirements For The Development Of Extended Reality Applications In Construction Projects: A Literature Review	Bing Han, Fernanda Leite
	CAS-69	Framework And Case Studies For Context-Aware AR System (CAARS) For Ubiquitous Applications In The AEC Industry	Gabriela Flores Linares, Nazila Roofigari-Esfahan, Daniel Antonio Linares-Garcia
	CAS-07	Vision-Based Recognition Of Construction Worker's Hand Signals	Xin Wang, Zhenhua Zhu
	CAS-48	Neural Networks In The Construction Industry: Knowledge Gaps And Possibilities	Emil L. Jacobsen, Jochen Teizer

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Mani Golparvar

Room: Fairfax	ADT-80	Challenges Of Implementing E-Ticketing For Rural Transportation Construction Projects	Gena Robertson, Su Zhang, Susan M. Bogus
	ADT-02	Developing A BIM-Based Linked Data Digital Twin Architecture To Address A Key Missing Factor: Occupants	Soroush Sobhkhiz, Tamer El-Diraby
	ADT-13	Exploratory Study On Applications, Benefits And Challenges Of Using Data Analytics In Construction Industry	Manideep Tummalapudi, Christofer M Harper, John Killingsworth, Prajakta Akhare, Sri Ram Murthy Suvvari
	ADT-24	Towards A Readiness Assessment For Wireless Technologies For Highway Construction And Infrastructure Asset Management	Amit Tripathi, Hala Nassereddine, Gabriel Dadi, Roy E. Sturgill

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Shantanu Kumar

Room: Prince William	ISR-96	Challenges And Risks In Resilience Management Of Water And Wastewater Infrastructures	Nikhitha Adepu, Sharareh Kermanshachi, Elnaz Safapour, Apurva Pamidimukkala
	ISR-45	Analyzing Critical Impacting Factors On The Future Of Bridges To Support Bridge Planning	A.M.M. Muhaimin, Lu Zhang, Xuan Lv, Nipesh Pradhananga, Vamsi Sai Kalasapudi
	ISR-50	Information Fusion And Finite Element Model Simulations For Bridge Condition Prognosis With Conflicting Data	Zhe Sun, Pingbo Tang, Ying Shi
	ISR-55	A Data Integration Approach For Assessment Of Rainfall-Induced Slope Failure Susceptibility	Anil Baral, Mohsen Shahandashti



**Friday March 11, 2022**  
**Session 4: 9:30 am - 10:30 am**

**Track 1: Construction Education**

Track Chair: Manideep Tummalapudi

	CED-04	Assessing The Impact Of Humanitarian Engineering Coursework On Upper-Division Undergraduate Engineering Identity Development	Leigh Hamlet, Jessica Kaminsky
Room:	CED-41	Concept Maps Lead To Better Problem Statements: An Empirical Study Measuring The Effects Of Priming Students To Think In Systems	Paulo Ignacio, Julie Milovanovic, Tripp Shealy, John Gero
Potomac 1	CED-42	Concept Maps Decrease Students' Neurocognitive Demand When Thinking About Engineering Problems	Ushma Manandhar, Mo Hu, Julie Milovanovic, Tripp Shealy, John Gero
	CED-33	The Impact Of Remote Learning On College Students' Workload And Productivity During The COVID-19 Pandemic	Biao Kuang, Chi Tian, Hongyue Wu, Yunfeng Chen, Luciana Debs

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Omid Shoghli

	HSW-20	A Novel Map-Matching Algorithm For Relating Work Zones And Crashes	Zhuoran Zhang, Burcu Akinci, Sean Qian
	HSW-26	Enhanced Situational Awareness In Worker-Robot Interaction In Construction: Assessing The Role Of Visual Cues	Shayan Shayesteh, Houtan Jebelli
Room:	HSW-77	Spatial Exposure To Dynamic Safety Hazards In Construction Sites Through 360-Degree Augmented Panoramas: Ecological Validity In Safety Research	Kyeongsuk Lee, Sogand Hasanzadeh, Behzad Esmaeili
Potomac 2	HSW-96	Investigation Of Factors Impacting Situation Awareness Of Highway Workers And Applicable Warning Methods	Wenjun Han, Nazila Roofigari-Esfahan, Ginny Nayyar

**Track 3: Automation in Construction**

Track Chair: Tianyu Zhou

	AIC-16	Intention Estimation In Physical Human-Robot Interaction In Construction: Empowering Robots To Gauge Workers' Posture	Yizhi Liu, Houtan Jebelli
Room:	AIC-21	Barrier Analysis Of Effective Implementation Of Robotics In The Construction Industry	Amit Ojha, Mahmoud Habibnezhad, Houtan Jebelli, Robert Leicht
Potomac 3	AIC-22	Digital Twin In The Architecture, Engineering And Construction Industry: A Bibliometric Review	Manea Almatared, Hexu Liu, Shengxian Tang, Mohammed Sulaiman, Zhen Lei, Hong Xian Li
	AIC-24	An Integrated Supervised Reinforcement Machine Learning Approach For Automated Clash Resolution	Ashit Harode, Walid Thabet, Xinghua Gao

**Track 4: Project and Organizational Management and Planning**

Track Chair: Vartenie Aramali

	PMP-72	Knowledge Exchanges In Complex Project Networks: Influence Model	Meltem Duva, Dong Zhao, Sinem Mollaoglu, Kenneth A. Frank
Room:	PMP-73	Network Topologies And Team Performance: A Comparative Study Of AEC Projects	Meltem Duva, Sinem Mollaoglu, Dong Zhao, Kenneth A. Frank
Potomac 4	PMP-15	An Integrated Sustainability Performance Criteria Checklist For Sustainable Public Housing Projects	Asma Almahde Sharafeddin, Ingrid Arocho
	PMP-17	Human Values In Sustainable Construction Management: A Literature Review	David Gutierrez, Leidy Klotz

**Track 5: Advanced Technologies and Data Analytics**

Track Chair: Jinwoo Kim

	ADT-01	A Sensor-Based Empirical Framework To Measure Construction Labor Productivity	Phuong Nguyen, Aminah Robinson Fayek, Farook Hamzeh
Room:	ADT-83	Simplified Emissions Measurement System For Construction Equipment	Jochen Teizer, Sā, Ren Wandahl
Potomac 5	ADT-89	Effectiveness Of A Real-Time Parking Guidance System	Deepak Kanhaiyalal Sharma, Scott Parr, Aycan Kara
	ADT-45	Synthetic Training Image Dataset For Vision-Based 3D Pose Estimation Of Construction Workers	Jinwoo Kim, Sanghyun Lee, Daeho Kim, Julianne Shah

**Track 6: Contracting, Project Delivery, and Legal Issues**

Track Chair: Amal Bakchan

	CDL-28	Enabling Faster Project Delivery Through Use Of Construction-Driven Designs	Aleksandra Markovic Graff, Jesus M. De La Garza
Room:	CDL-29	Determining Contract Requirements For Quality Assurance Program In Innovative Project Delivery	Jung Hyun Lee, Evan Mistur, Lier Liu, Baabak Ashuri
Potomac 6	CDL-39	CMAR Procurement In U.S. Public Projects: Qualifications-Driven Processes And Criteria	Hala Sanboskani, Mounir El Asmar, Bahaa Chammout, Oscar Bou Maachar
	CDL-48	A Comparison Of Georgia DOT's Design-Build Legislation And Project Expenditures With Those Of Bordering States	Wesley Mitchell, Raed Jarrah, Chang-Ray Chen

**Friday March 11, 2022**  
**Session 4: 9:30 am - 10:30 am**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Soowon Chang

Room: Arlington	CAS-39 CAS-46 CAS-19 CAS-26	<p>Simulating Urban Population Activities Under Extreme Events With Data-Driven Agent-Based Modeling</p> <p>The Concept Of Digital Twin For Construction Safety</p> <p>Management Solutions For Cyber-Physical Security In Smart Built Environment</p> <p>Capturing Dynamics Of UAS-Based Construction Safety Management Using Causal Loop Diagram</p>	<p>Haiyan Hao, Yan Wang, Qi Wang</p> <p>Jochen Teizer, Karsten W. Johansen, Carl Peter Leslie Schultz</p> <p>Ping Xu, Xinghua Gao, Philip Agee</p> <p>Soowon Chang, Kyungki Kim, Jinhyuk Kwon, Sungjin Kim</p>
--------------------	--------------------------------------	--	--

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Cristina Torres-Machi

Room: Fairfax	ADT-46 ADT-61 ADT-19 ADT-28	<p>Emergency Management In Smart Cities: Infrastructure-Less Communication Systems</p> <p>A Theoretical Architecture For Data-Quality-Aware Analytical Applications In The Construction Firms</p> <p>Exploring The Capabilities Of Optical Satellite Imagery To Evaluate Pavement Condition</p> <p>Drivable Space Extraction From Airborne Lidar And Aerial Photos</p>	<p>Mohammad Ilbeigi, Azita Morteza, Ramtin Ehsani</p> <p>Xi He, Rui Liu, Chimay Anumba</p> <p>Mohammad Bashar, Cristina Torres-Machi</p> <p>Ryan Dow, Su Zhang, Susan Bogus, Fei Han</p>
------------------	--------------------------------------	--	--

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Yewande Abraham

Room: Prince William	ISR-67 ISR-70 ISR-18 ISR-83	<p>Towards Sustainable Management Of Disaster Debris: Three-Phase Post-Disaster Data Collection Planning</p> <p>Disasters As Mega-Disruptions To Construction Supply Chains</p> <p>Exploring Challenges To Implement An Integrated Urban Infrastructure Management Approach</p> <p>A Literature Review On The Human Dimension In Water-Energy Nexus</p>	<p>Hiba Jalloul, Juyeong Choi, Sybil Derrible, Nazli Yesiller</p> <p>Erin Arneson</p> <p>Felipe Araya, Sebastian Vasquez</p> <p>Zheng Ren, Jintao Zhang, Iram Sifat, Wenjun Xiang, Wei Zhang, Baikun Li, Jin Zhu</p>
----------------------------	--------------------------------------	---	--

**Friday March 11, 2022**  
**Session 5: 11:00 am - 12:00 pm**

**Track 1: Construction Education**

Track Chair: Manideep Tummalapudi

	CED-24	International Construction Education Experiences: Designing A Comprehensive Research Approach	Verena Schneider, David Grau, Samuel T. Ariaratnam
Room: Potomac 1	CED-08	Construction Industry Institute's Impact On Construction Engineering And Management Academic Publications	Amelia Celozo, Fernanda Leite, Daniel P. De Oliveira
	CED-18	Operationalization Of Desirable Skill Sets In Novice Construction Management Professionals	Daniel Yamoah Agyemang, Patrick Sik Wah Fong, Ernest Kissi
	CED-37	Relationship Between Student Engagement And Academic Network Properties	Zhiting Chen, Dong Zhao

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Idris Jeelani

	HSW-19	Towards A Safety Culture Model For Small Construction Organizations	Ashtarout Ammar, Zaman Al-Shabbani, Gabriel Dadi
Room: Potomac 2	HSW-23	Review Of Safety Resilience In Construction: Current Research Status, Challenges, And Future Needs	Joshua D. Robbins, Jun Wang, Behzad Esmaili
	HSW-40	Preventative Safety Metrics With Highway Maintenance Crews	Zamaan Al-Shabbani, Ashtarout Ammar, Gabriel Dadi
	HSW-47	Review For Construction And Demolition Waste Materials And Control Practices In The U.S.	Abdulaziz Alwadhanani, Yoojung Yoon, Radhey Sharma

**Track 3: Automation in Construction**

Track Chair: Temitope Akanbi

	AIC-30	Utilizing Text Analysis In Systematic Review Design: Perceptual And Cognitive Barriers To Adoption Of Robotic And Automated Systems In Construction	Edward Seh-Taylor, Christopher Mccarty, Mayha Sam, Bryan Franz
Room: Potomac 3	AIC-39	Dematerialization In Housing Industry: Modular Light Wood-Frame Structure Vs Conventional Wood-Frame Structure For Multi-Family Housing	Arezou Sadoughi, Gregory Sloditskie
	AIC-47	Towards Intelligent Agents To Detect Work Pieces And Processes In Modular Construction: An Approach To Generate Synthetic Training Data	Keundeok Park, Semiha Ergan
	AIC-48	The Need For Responsive Environments: Bringing Flexibility To Clinic Spaces	Daniel Bin Lu, Semiha Ergan, Devin Mann, Katharine Lawrence

**Track 4: Project and Organizational Management and Planning**

Track Chair: Rita El Kassis

	PMP-43	Lean Adoption For Trade Contractors: Benefits, Barriers, And Path Forward	Elnaz Asadian, Robert Leicht, John Messner
Room: Potomac 4	PMP-48	Development Of Key Performance Indicators For Performance Assessment Of Owner's Project Managers	Shantanu Kumar, Mohammed S. Hashem M. Mehany
	PMP-85	Evms Maturity And Its Impact On Project Cost And Schedule Performance Of Large And Complex Projects: A Preliminary Analysis	Mounir El Asmar, G. Edward Gibson, Jr., Vartenie Aramali, Hala Sanboskani
	PMP-81	Construction Business Strategies Used By General Contractors In The United States For Market Enhancement	Haiyan Sally Xie, Jayraj Singh Solanki, Owen Shi

**Track 5: Health, Safety, and Workforce Issues**

Track Chair: Minerva Bonilla

	HSW-79	Physical, Mental, And Emotional Health Of Construction Field Labors Working In Extreme Weather Conditions: Challenges And Overcoming Strategies	Sanjgna Karthick, Sharareh Kermanshachi, Mostafa Namian
Room: Potomac 5	HSW-12	Feasibility Of A Mobile Electroencephalogram (EEG) Sensor-Based Stress Type Classification For Construction Workers	Gaang Lee, Sanghyun Lee
	HSW-16	Lean-Based Integrated Approach For Manual Work Design Optimization In Modular Construction	Ahmed Zaalouk, Sanghyeok Han
	HSW-28	A Study On Assessing The Awareness Of Heat-Related Illnesses In The Construction Industry	Siyuan Song, Fan Zhang

**Track 6: Contracting, Project Delivery, and Legal Issues**

Track Chair: Hani Alzraiee

	CDL-10	Identifying Contingency Liability From P3 Contracts Using Rule-Based NLP	Yu Wang, Qingbin Cui, Kunqi Zhang, Man Liang
Room: Potomac 6	CDL-09	In The Name Of The Pandemic: A Case Study Of Contractual Modifications In PPP Solicited And Unsolicited Proposals In COVID-19 Times	Gabriel Castelblanco, Jose Guevara, Paula Mendez-Gonzalez
	CDL-18	PPP Renegotiation Flight Simulator: A System Dynamics Model For Renegotiating PPPs After Pandemic Crisis	Gabriel Castelblanco, Jose Guevara, Paula Mendez-Gonzalez
	CDL-24	Investigating Financial Risks Associated With Public-Private Partnerships For Transportation Project Delivery	Kalyani Joshi, Christofer M. Harper, John Killingsworth, Suren Chen

**Friday March 11, 2022**  
**Session 5: 11:00 am - 12:00 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Azita Morteza

	CAS-31	An Optimal Resource Allocation Strategy For Retrofitting Unreinforced Masonry Buildings In The Pre-Disaster Stage	Mohammad Sadra Fardhosseini, Amit Ojha2, Mahmoud Habibnezhad, Houtan Jebelli, Hyun Woo Lee
Room:	CAS-33	Semi-Automatic Pipe Network Reconstruction Using Point Cloud Data	Patrick Borges Rodrigues, Paul Crovella
Arlington	CAS-36	Ontology-Based Semantic Modeling For Steel Bridge Coating Systems: Toward Analysis Of Factors That Impact Coating Premature Failures	Md Ashiqur Rahman, Lu Zhang, Kingsley Lau, Xuan Lv, Parasar Gosain
	CAS-38	Household-Targeted Hurricane Warnings For Effective Evacuation: Case Study Of Hurricane Irma In North Miami Beach	Shangde Gao, Yan Wang, Qi Wang

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Mohammad Bashar

	ADT-48	Real-Time Participatory Sensing-Driven Computational Framework Toward Digital Twin City Modeling	Jaeyoon Kim, Youngjib Ham
Room:	ADT-76	Case Study: Assessing The Structural Condition Of Steel Bridges Using Terrestrial Laser Scanner (TLS)	Hani Alzraiee, Luke Psomas, Ryan Trainor
Fairfax	ADT-88	Network And Cluster Analysis On Bridge Inspection Reports Using Text Mining Algorithms	Younghan Edwin Jung, Mingon Kang, Michael Myung Jeong, Junyong Ahn
	ADT-10	Characteristic-Based Network Analysis On Construction Hazard Warning: A Novel Approach Of Network Of Networks	Mei Liu, Pin-Chao Liao

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Amal Bakchan

	ISR-102	Post-Hurricane Recovery Process: Analysis Of The Public And Subject Matter Experts' Perspectives Using Structural Equation Modeling (SEM)	Behzad Rouhanizadeh, Sharareh Kermanshachi
Room:	ISR-104	Investigation Of Causal Relationships Among Factors Affecting Post-Disaster Reconstruction Process: Adoption Of Social Network Analysis (SNA) Method	Behzad Rouhanizadeh, Sharareh Kermanshachi
Prince William	ISR-93	Homeowners' Motivations To Invest In Energy-Efficient Technologies In Residential Buildings Of Rural Midwest America	Linnel Marie Ballesteros, Cristina Poleacovschi, Ulrike Passe, Kristen Cetin, Anne Kimber, Diba Malekpour Koupaie, Tanya Sharma, Forrest Douglass
	ISR-122	Human-In-The-Loop Model Predictive Operation For Energy Efficient Hvac Systems	Mostafa Meimand, Farrokh Jazizadeh

**Friday March 11, 2022**  
**Session 6: 1:30 pm - 2:30 pm**

**Track 1: Construction Education**

Track Chair: Yang (Gilbert) Ye

	CED-03	Full Scale Augmented Reality To Support Construction Sequencing Education Case Study	Kieren H. Mccord, Steven K. Ayer, Karan R. Patil, Wei Wu, Jeremi S. London, Logan A. Perry
Room:	CED-11	Feasibility Of Embodied Virtual Agents For Augmenting Students' Knowledge Of Robotic Safety In Construction	Amit Ojha, Houtan Jebelli, Mahmoud Habibnezhad
Potomac 1	CED-43	Exploring The Benefits Of Social Presence Enabled Augmented Reality Platform For Online Learners	Saurav Shrestha, Yongwei Shan, Ph.D., P.E., Brian Chung
	CED-36	Data Analytics And Computational Thinking In Construction Engineering And Management Education: A Conceptual System	Abiola Akanmu, Vincent S Akligo, Omobolanle Ogunseju, Sang Won Lee, Homero Murzi

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Idris Jeelani

	HSW-08	Defining Serious Injuries On Construction Jobsites: Lessons From The Literature	Arnaldo Bayona, Siddharth Bhandari, Matthew R. Hollowell
Room:	HSW-49	Random Forest Analysis Of Occupational Accident Reports Among Roofing Contractors	Ikechukwu Sylvester Onuchukwu, Behzad Esmaeil
Potomac 2	HSW-53	Numerical Simulation Of Asphalt Fumes Diffusion During Pavement Construction Using CFD Method	Dan Chong, Hui Hou, Qi Feng
	HSW-24	Impact Of Green Construction On Safety Performance In The Built Environment	Ali Amer Karakhan, Ahmed Jalil Al-Bayati, Hashem Izadi Moud, Ola Thamer Al-Saffar

**Track 3: Automation in Construction**

Track Chair: K. Joseph Shrestha

	AIC-14	Identification Of Indicators For Effectiveness Evaluation Of Four-Legged Robots In Automated Construction Progress Monitoring	Kereshmeh Afsari, Srijeet Halder, Ryan King, Walid Thabet, John Serdakowski, Stephen Devito, Mahnaz Ensafi, Jason Lopez
Room:	AIC-20	A Framework To Enhance Utilization Of Automated Progress Measurements In Construction Projects	Negar Mansouri Asl, Ahmed Hammad
Potomac 3	AIC-53	A Practical Application Using Parametric Modeling For As-Built BIM Generation From Point Clouds	Jong Won Ma, Yu-Chen Lee, Fernanda Leite
	AIC-28	Application Of Unmanned Aerial System (UAS) In Highway Construction Progress Monitoring Automation	Reihaneh Samsami, Amlan Mukherjee, Colin N Brooks

**Track 4: Project and Organizational Management and Planning**

Track Chair: Vartenie Aramali

	PMP-03	Choosing By Advantages (CBA) Method To Determine Feasibility Of Mass Timber Building Material In The US Construction Market	Shafayet Ahmed, Ingrid Arocho
Room:	PMP-30	Using Functional Near-Infrared Spectroscopy (FNIRS) To Evaluate The Construction Decision Making Inventory (CDMI)	Krishna Kisi, Tulio Sulbaran
Potomac 4	PMP-58	A Quantitative Assessment Of Change Adoption Success Within The Facility Management Industry	Dipin Kasana, Justin Dodd, Jake Smithwick, Amirali Shalwani, Brian Lines
	PMP-02	Facility Design Standardization: Six Solution Pieces And Industry Maximization Enablers	Jin Ouk Choi, Binit Kumar Shrestha, Seung Ho Song, Jennifer Shane, Young Hoon Kwak

**Track 5: Construction Scheduling, Estimating, Economics, and Controls**

Track Chair: Manideep Tummalapudi

	CEC-08	Developing A Multivariate Time-Series Model To Forecast The Level Of Competition In Transportation Projects	Minsoo Baek, Baabak Ashuri, Suma Veeravenkatappa
Room:	CEC-10	A Pattern-Recognition Method For Highway Construction Project Expenditure Cash Flows Using Clustering-Based K-Means Approach	Minsoo Baek, Yunping Liang, Baabak Ashuri
Potomac 5	CEC-16	Predicting Ratio Of Low Bid To Owner's Estimate Using Feedforward Neural Networks For Highway Construction	Mingshu Li, Qiu Zheng, Baabak Ashuri
	CEC-27	Forecasting Architecture Billings Index Using Time Series Models	Soojin Kim, Bahram Abediniangerabi, Mohsen Shahandashti

**Track 6: Contracting, Project Delivery, and Legal Issues**

Track Chair: Chau Le

	CDL-40	Award Algorithms And Technical Scoring Trends In Design-Build Best-Value Highway Projects	Maria Calahorra-Jimenez
Room:	CDL-23	Transferal Of Responsibilities Of PPP European Equity Markets: Dependency Analysis	John Sebastian Salazar, Jose Alberto Guevara, Luis Alberto Herrera
Potomac 6	CDL-49	Synthesis Of Challenges For Public-Private Partnerships (PPPs) In Transportation Infrastructure In South East Asia	Chi Nguyen Anh, Michael J. Garvin
	CDL-26	The Moderating Role Of Trustworthiness In The Relationship Between Institutional Distance And Private Ownerships In PPPs: Evidence From Emerging Markets And Developing Countries	Qinghua He, Yang Li, Ge Wang, Zilun Wang

**Friday March 11, 2022**  
**Session 6: 1:30 pm - 2:30 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Mohammad Ilbeigi

Room: Arlington	CAS-47	Toward Wi-Fi-Enabled Real-Time Communication For Proactive Safety Systems In Highway Work Zones: A Case Study	Sepehr Sabeti, Omidreza Shoghli, Hamed Tabkhi
	CAS-49	Evaluating Facility Asset Information Needs In A Common Data Environment To Support Maintenance Workers	Zahra Ghorbani, Rebecca Napolitano, Craig Richard Dubler, John Isaac Messner
	CAS-54	Adopt The 3D BIM Coordination During The Early Design Stages In Egypt	Mahmoud Othman, Emad Elbeltagi, Mohamed Abdel Shakour, Ahmed Amer
	CAS-61	Digital Twin In Practice: Emergent Insights From An Ethnographic-Action Research Study	Ashwin Agrawal, Vishal Singh, Robert Thiel, Michael Pillsbury, Harrison Knoll, Jay Puckett, Martin Fischer

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Omid Shoghli

Room: Fairfax	ADT-29	Characterizing Residential Energy Consumption Patterns In The Rural Midwest	Diba Malekpour, Kristen Cetin, Ulrike Passe, Cristina Poleacovschi, Anne Kimber
	ADT-44	Artificial Intelligence For Equitable Practices In Energy Infrastructure: Literature Review	Anne Ruckman, Jessica Kaminsky
	ADT-47	Semantic Modeling For Supporting Planning Decision Making Towards Smart Cities	Lan Zhang, Kaijian Liu
	ADT-57	Spatial Analysis On Routine Occupant Behavior Patterns And Associated Factors In Residential Buildings	Yunjeong Mo, Dong Zhao

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Jianli Chen

Room: Prince William	ISR-25	Unifying Assessments Of Sustainability And Resilience In Civil Infrastructure Systems: The Case Of Masonry Structures	Samir Jung Pandey, Arif Mohaimin Sadri, Wallied Orabi
	ISR-26	Critical Review Of Sustainability, Resilience And Their Unifying Assessments For Civil Infrastructure Systems	Samir Jung Pandey, Arif Mohaimin Sadri
	ISR-46	A Review Of A Socio-Technical System Approach For Interdependent Infrastructure Systems Resilience Analysis: Present Status And Future Trends	Chen Xia, Yuqing Hu
	CED-25	Exploring Disaster Preparedness And Awareness Due To Natural Hazards Using Structural Equation Modelling (SEM)	Ronik Patel, Sharareh Kermanshachi, Roya Etmnani-Ghasrodashti, Mohammadsoroush Tafazzoli

**Friday March 11, 2022**  
**Session 7: 2:45 pm - 3:45 pm**

**Track 1: Engineering and Materials Design, Quality, and Value Management**

Track Chair: Ghada Gad

Room: Potomac 1	EQV-03 Cost Analysis Of A Mass Timber Building Project: Comparison Of Budgeted And Actual Construction Cost	Shafayet Ahmed, Ingrid Arocho
	EQV-04 Identifying The Level Of Awareness And Challenges To Adopt Mass Timber By The Construction Practitioners In The United States	Shafayet Ahmed, Ingrid Arocho
	EQV-27 Leed Assessment Of Green Lightweight Concrete Containing Plastic Based Aggregates In Construction	Fahad K. Alqahtani, Ibrahim Abotaleb, Sara Harb
	EQV-12 Performance Of Engineered Cementitious Composite Material Under Differing Site Conditions	Michele Anderson, Susan Bogus

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Sogand Hasanzadeh

Room: Potomac 2	HSW-25 Construction Hazard Recognition: A Smart Literature Review	S. M. Jamil Uddin, Abdullah Alsharif, Alex Albert, Siddharth Bhandari
	HSW-54 Noise Management In Construction: Identifying Strategies And Controls For Improvement	Ifeanyi Okpala, Tolulope Sanni, Chukwuma Nnaji
	HSW-09 Musculoskeletal Disorders In Concrete Formwork Construction	Ziyu Jin, John Gambatese
	HSW-51 Biomechanical Analysis In Construction Engineering And Management Research: A Review	Abdullahi Ibrahim, Chukwuma Nnaji, Ziyu Jin

**Track 3: Automation in Construction**

Track Chair: Ashit Harode

Room: Potomac 3	AIC-50 Automated Process Data Collection For Modular Construction Using Computer Vision	Roshan Panahi, Joseph Louis, Ankur Podder, Colby Swanson
	AIC-65 A Decision Support System For The Integration Of Robotics In Offsite Construction	Behnam M. Tehrani, Cagri Goksel Ozmerdiven, Aladdin Alwisay
	AIC-35 Graphical Networks For Optimizing Hospital Layouts At Macro And Micro Scales	Jennifer I. Lather, Andrew I. Harms
	AIC-43 Drone-Related Deployment Limitations In Construction: A Research Roadmap	Gilles Albeaino, Masoud Gheisari, Raja R. A. Issa

**Track 4: Project and Organizational Management and Planning**

Track Chair: Phil Barutha

Room: Potomac 4	PMP-21 Mitigating The Winner's Curse Dilemma In Multi-Stage Construction Bidding	Muaz Ahmed, Islam El-Adaway, Kalyn Coatney
	PMP-35 Front End Planning For Industrial Projects: Identifying The Reasons Behind Schedule And Cost Overruns Using The New PDRI MATRS	Namho Cho, G. Edward Jr. Gibson, Mounir El Asmar
	PMP-42 Are Different Innovations More Challenging To Implement: A Comparison Of Different Types Of Changes In The AEC	Omar N. Maali, Amirali Shalwani, Brian C. Lines, Kristen Hurtado, Kenneth T. Sullivan
	PMP-51 A Framework For Assessing Strategies To Combat Individuals' Resistance To Technological Innovation In The Construction Industry	Yelly Kwesly Lawluyv, Fangyu Guo, Kaiyang Wang

**Track 5: Construction Scheduling, Estimating, Economics, and Controls**

Track Chair: Manideep Tummalapudi

Room: Potomac 5	CEC-14 Framework Of Automatic Cycle Schedule Management Based On BIM Technology	Yanhui Jia, Ding Liu
	CEC-17 Feasibility Of An Integrated Heuristic And Machine Learning Approach For Schedule Health Monitoring In Construction	Yoonhwa Jung, Fouad Amer, Mani Golparvar-Fard
	CEC-30 Developing Assessment Criteria For State DOTs' Standard Specifications On Contractor Schedules	Byung Gi Han, Junghye Son, Nabeel Khwaja, William J. O'Brien
	CEC-06 Construction Insurance Machine-Learning Estimation Approach For Multiple Attempted Bids	Ayman El Hakea, Mohamed S. Eid

**Track 6: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Chen Xia

Room: Potomac 6	ISR-38 Comparison Of Different Blue-Green Infrastructure Strategies In Mitigating Urban Heat Island Effects And Improving Thermal Comfort	Siqi Jia, Yuhong Wang
	ISR-94 Assessment Of The Relative Importance Of The Main Parameters Used In The Selection Of The Urban Heat Island Mitigation Strategies	Mohamed Abdel Raheem, Bahareh Bathaei
	ISR-37 Incorporating The Human Factor In Modeling Interdependent Infrastructure Systems	Joseph Jonathan Magoua, Fei Wang, Nan Li
	ISR-117 The Envision Rating System Helps Shape Public Preferences For Sustainable Stormwater Design	Mo Hu, Tripp Shealy

**Friday March 11, 2022**  
**Session 7: 2:45 pm - 3:45 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Yuqing Hu

Room:	CAS-23	A Survey Of Trends Of Building Fire Simulation In The Architecture, Engineering, And Construction (AEC) Domains	Fan Yang, Jiansong Zhang, Bedrich Benes
Arlington	CAS-27	Computer Vision-Driven Building Energy Modeling Framework For Post Occupant Interior Energy Consumption	Pochien Yu, Mingshun Tseng, Jacob J. Lin
	CAS-73	Exploring Human-Building Energy-Related Actions Modeling And Simulation	Seddigheh Norouziasl, Amirhosein Jafari
	CAS-80	Issues In Bi-Directional Interoperability Between BIM And BEM	Hang Li, Jiansong Zhang, Xiaorui Xue, Luciana Debs, Soowon Chang, Ming Qu, Anthony Sparkling, David Goldwasser

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Jianli Chen

Room:	ADT-77	Energy And Demand Saving Potential Due To Integrated Hvac, Lighting, And Shading Controls In Small Office Buildings	Soham Vanage, Hao Dong, Kristen Cetin
Fairfax	ADT-71	Nudging Occupants For Energy-Saving Through Voice-Based Proactive Virtual Assistants	Tianzhi He, Farrokh Jazizadeh
	ADT-08	Aging In Smart Buildings: How Can Smart Building Technologies Support The Cognitively Impaired Aging Population	Saeid Alimoradi, Xinghua Gao
	ADT-17	Estimating Construction Work Zones Capacity Using Deep Neural Network	Ali Hassandokht Mashhadi, Nikola Markovič, Abbas Rashidi

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Bethany Gordon

Room:	ISR-100	Key Components In Schedule Development Of Post-Disaster Reconstruction Projects	Elnaz Safapour, Sharareh Kermanshachi
Prince William	ISR-07	Transitioning To The Next Era Of Modular Construction: Reconfiguration, Reuse And Building Stock Agility	Christopher Rausch, Sheida Shahi, Aziz Dhamani, Carl Haas
	ISR-12	Digitization, Digitalization And Digital Transformation (3Ds): Explicating The Disparities And Applications Of The 3Ds In The Construction Industry	Emmanuel Kingsford Owusu, Albert P.C. Chan, Linyan Chen, Peter Amoah
	ISR-34	Factors And Indicators To Assess Sustainable Development Goals (SDG) In Public Works Procurement	Laura Montalban-Domingo, Tatiana Garcia-Segura, Maria Amalia Sanz-Benlloch, Eugenio Pellicer



**Friday March 11, 2022**  
**Session 8: 4:15 pm - 5:15 pm**

**Track 1: Engineering and Materials Design, Quality, and Value Management**

Track Chair: Min Deng

	EQV-06	Structural Behaviour Of Composite Reinforced Concrete One-Way Slabs Voided With Plastic Bubbles	Amer Mohammed Ibrahim, Ibrahim Abbas, Rouwaida Hussein Ali
Room:	EQV-10	Life Cycle Cost Assessment Of Green Lightweight Concrete Utilizing Recycled Plastic Based Lightweight Aggregates	Fahad K. Alqahtani, Ibrahim Abotaleb, Mohamed Elmenshawy
Potomac 1	EQV-26	Investigation Of Relationship Between Geotechnical Parameters And Electrical Resistivity Of Sandy Soils	Mina Zamanian, Mohsen Shahandashti
	EQV-13	Identifying And Prioritizing Criteria For Selecting Sustainable Façade Materials Of High-Rise Buildings	Pouria Mohammadi, Amir Mohammad Ramezaniapour, Abdolmajid Erfani

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Kyeongsuk (Sean) Lee

	HSW-07	Leveraging Natural Language Processing To Identify Health And Safety Challenges During Post-Disaster Reconstruction	S. M. Jamil Uddin, Mahzabin Tamanna, Alex Albert, Nipesh Pradhananga
Room:	HSW-38	Hiring For The New Age: Job Advertisements And The Transportation Workforce	Kristal Metro, Susan M. Bogus, Christofer Harper
Potomac 2	HSW-62	Investigating Hazards And Safety Risks Inherent In Human-Robot Interactions	Ifeanyi Okpala, Chukwuma Nnaji, John Gambatese
	HSW-74	Scale Equivalence In Canada And The United States For Interpersonal Conflicts At Work And Individual Resilience In The Construction Sector	Yuting Chen, Brenda Mccabe, Jun Wang, Douglas Hyatt

**Track 3: Automation in Construction**

Track Chair: Abiola Akinniyi

	AIC-44	BIM Integration And Value Engineering: Design For Assembly, Optimization And Real Time Cost Visualization In Off-Site Construction	Arun Sekhar, Uma Maheswari
Room:	AIC-54	Information Exchange For Supporting BIM To Robotic Construction	Austin Dennis Mcdlymonds, Somayah Asadi, Robert Leicht, Alan Wagner
Potomac 3	AIC-03	Named Entity Recognition Algorithm For Ibisds Using Neural Network	Ning Wang, Raja R. A. Issa, Chimay J. Anumba
	AIC-40	Extraction Of Activities Information From Construction Contracts Using Natural Language Processing (NLP) Methods To Support Scheduling	Fahad Ul Hassan, Tuyen Le

**Track 4: Project and Organizational Management and Planning**

Track Chair: David Gutierrez

	PMP-52	Digital Technology In Architecture, Engineering And Construction (AEC) Industry: Research Trend And Practical Status Towards Construction 4.0	Kaiyang Wang, Fangyu Guo, Cheng Zhang, Jianli Hao, Dirk Schaefer
	PMP-60	Identification Of The Barriers To Data-Centric Approach In The Construction Industry	Ali Karji, John Messner, Robert Leicht, Christopher Mccomb
Room:	PMP-64	A Comparative Analysis Of Production Metrics Across VDC Implementations	Tulika Majumdar, Steinar G. Rasmussen, Alexandre Almeida Del Savio, Katrin Jóhannsdottir, Eilif Hjelsest, Martin Arthur Fischer
Potomac 4	PMP-78	Transition To Supervision: A Skill Gap Analysis Between Female And Male Construction Supervisors	Callie Thomason French, Susan Bogus

**Track 5: Construction Scheduling, Estimating, Economics, and Controls**

Track Chair: Chau Le

	CEC-01	Economic Vulnerability Assessment Of The Construction Industry In The United States	Arkaprabha Bhattacharyya, Makarand Hastak
	CEC-23	Prediction Of Egypt's Construction Industry Resilience	Ahmed Gamal Shiha, Elkhayam Dorra
Room:	CEC-24	Integrated Dematel And ANP-Based Framework To Model Construction Labor Productivity	Ali Bayesteh, Elyar Pourrahimian, Ming Lu, Simaan Abourizk
Potomac 5	CEC-26	Cost Estimate Risk Factors In U.S. Army Corps Of Engineers' Emergency Streambank Protection Projects	Hunter Waugaman, Mohammad Ammar Alzarrad, James Bryce

**Track 6: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Mohammad Ilbeigi

	ISR-17	Designing A Communication Practice To Build Community Capacity For Safer Housing	Briar Goldwyn, Amy Javernick-Will, Abbie Liel, Matthew Koschmann
	ISR-32	Identifying And Assessing Critical Indicators Of Resilience In Active Construction Sites	M. Ahmed Rusho, Md Nizamul Hoque Mojumder, Arif Mohaimin Sadri, Lu Zhang
Room:	ISR-22	Identifying The Commonalities Between Lean Construction And Leed Requirements	Emel Sadikoglu, Sevilay Demirkesen, Chengyi Zhang
Potomac 6	ISR-74	Benchmarking Drinking Water Consumption During Construction Phase	Hashem Izadi Moud, Kenneth Sands, Craig Capano, Jalen Vowels, Kailey Stockinger, Jeanette Hariharan

**Friday March 11, 2022**  
**Session 8: 4:15 pm - 5:15 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Yang (Gilbert) Ye

Room: Arlington	CAS-12	Machine Learning-Enabled Automatic Vehicle Detection For Virtual Weigh-In-Motion Applications	Mohammad Afsar Sujon, Fei Dai
	CAS-10	Visual Surveying Of On-Road Vehicle Height For Over-Height Warning Using Deep Learning And View Geometry	Linjun Lu, Fei Dai
	CAS-11	A Convolutional Neural Network Model For Identifying Unclassified And Misclassified Vehicles Using Spatial Pyramid Pooling	Jieyi Bao, Xiaoqiang Hu, Yi Jiang, Shuo Li
	CAS-70	Development Of Virtual Reality-Based Driving Simulator For Assessing Digital Speed Feedback Signs	Qichao Wang, Dong Zhao, Timothy Gates, Peter Savolainen

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Tuyen (Robert) Le

Room: Fairfax	ADT-67	Blockchain-Based Methodology For Collaborative Risk Assessment	In Bae Chung, Carlos Caldas
	ADT-55	Mining And Visualizing Cost And Schedule Risks From News Articles With NLP And Network Analysis	Nan Gao, Ali Touran, Qi Wang
	ADT-04	Artificial Intelligence Application For Risk Template Generation In Major Transportation Projects	Abdolmajid Erfani, Veronica Hercules Villeda, Qingbin Cui
	ADT-20	Machine Learning And Artificial Intelligence Applications In Building Construction: Present Status And Future Trends	Mahnaz Ensafi, Saeid Alimoradi, Xinghua Gao, Walid Thabet

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Soowon Chang

Room: Prince William	ISR-40	A Unified Tool To Foster Front-End Planning And Sustainability In Infrastructure Projects	Valentina Ferrer, Piyush Pradhananga, Mohamed ElZomor
	ISR-53	Energy Infrastructure Scenarios For Reducing Distribution Losses And Carbon Emissions Using Multimethod Simulation With GIS	Soowon Chang
	ISR-56	Developing A Sustainability And Resilience Monitoring Scheme For Infrastructure Projects Using Sustainable Development Goals (SDGs)	Shantanu Kumar, Mohammed S. Hashem M. Mehany
	ISR-59	Governing Contractor Greenwashing Behaviors In Construction Projects: The Heterogeneous And Interactive Roles Of Formal Contracts And Trust	Zilun Wang, Ge Wang, Yuan He, Yang Li

**Saturday March 12, 2022**  
**Session 9: 8:15 am - 9:15 am**

**Track 1: Engineering and Materials Design, Quality, and Value Management**

Track Chair: Shayan Shayesteh

	EQV-16	Mistakeproofing Framework And Applications In Civil Engineering Operations And Products	Iris D. Tommelein, Karilin Yiu
Room:	EQV-17	Modular Adaptable Hospital Design (MAHD): Proposing a Design and Construction Methodology for Flexible and Adaptable Hospitals	Gordon Kučan, Daniel Mark Hall, David Grossmann, Konrad Graser
Potomac 1	EQV-23	Literature Review Of Residential Above Ground Storm Shelter	Bi Zhang, Ajay Shanker
	EQV-09	Critical Constructability Review Indicators For Construction Of Transportation Infrastructure	Minerva Bonilla, William Rasdorf, Amin Akhnouk, Nick Norboge, Daniel Findley, Clare Fullerton

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Krishna Kisi

	HSW-06	Incident Investigations And Learning: Methods, Barriers And Opportunities	Sreeja Thallapureddy, Siddharth Bhandari, Matthew Ryan Hallowell, Fred Sherratt, Evan Stoddard, Hayley Hansen
Room:	HSW-18	Assessing The Safety Climate Of A State Department Of Transportation Through Its Highway Maintenance Crews	Ashtarout Ammar, Zaman Al-Shabbani, Gabriel Dadi
Potomac 2	HSW-22	Annual Revenue's Influence On The Safety Performance Of Construction Firms	Ahmed Jalil Al-Bayati, Ali A. Karakhan
	HSW-42	Safety Risks Of Reconstruction Workers In Clean-Up And Recovery Phase Due To Natural Hazards	Apurva Pamidimukkala, Sharareh Kermanshachi, Thahomina Jahan Nipa

**Track 3: Automation in Construction**

Track Chair: Temitope Akanbi

	AIC-67	Built-In Versus Standalone Code Checking The Case Of Automated Egress Path Checker	Abdelhamid Abdullah, Khaled Nassar, Alaa Mandour
Room:	AIC-18	Model Validation For Automated Building Code Compliance Checking	Jin Wu, Jiansong Zhang, Luciana Debs
Potomac 3	AIC-29	Automated Construction Progress Monitoring Of Partially Completed Building Elements Leveraging Geometry Modeling And Appearance Detection With Deep Learning	Aritra Pal, Jacob J. Lin, Shang-Hsien Hsieh
	AIC-07	Computer Vision-Based Geometry Mapping And Matching Of Building Elements For Construction Robotic Applications	Christopher Lacny, Jiansong Zhang

**Track 4: Project and Organizational Management and Planning**

Track Chair: Hala Sanboskani

	PMP-87	Determinants For Operating Organization Selection In Urban Rail Transit Project Under Public-Private Partnerships	Xian Zheng, Rui Li, Long Yi Han, Ying Jia Chen, Xiao Hu
Room:	PMP-40	Assessing Automation Readiness Of Recurring Pavement Failure In Developing Countries: Case Studies Of Nigeria And Jordan	Olugbenro Ogunrinde, Ifeanyi Udodilim Okpala, Rapheal Ojelabi Abiodun, Opeyemi Oyeyipo, Muhammad Tyseer Hatamleh
Potomac 4	PMP-49	Comparative Analysis Of Right Of Way Acquisition Processes By State DOTs	Frederick Chung, Baabak Ashuri
	PMP-74	Integration Of Utility Coordination And Highway Design	Shani Montes, Roy E. Sturgill, Timothy R.B. Taylor

**Track 5: Construction Scheduling, Estimating, Economics, and Controls**

Track Chair: Hamed Alikhani

	CEC-42	Optimization Of Multi-Skilled Labor With The Application Of Partial Allocation Of Resources	Amira Saleh, Ibrahim Abotaleb, Ossama Hosny
Room:	CEC-32	An Artificial Intelligence Based Model For Construction Activity Sequence Prediction In Highway Projects	Hamed Alikhani, David Jeong
Potomac 5	CEC-15	Construction Procedural Information Extraction From Textual Sources To Support Scheduling	Ran Ren, Jiansong Zhang
	CEC-11	Global And Local Risk Factors Causing Correlation Between Activities In Fuzzy Linear Schedules	Yi Su, Shabtai Isaac, Gunnar Lucko

**Track 6: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Karen Gupta

	ISR-08	Graph-Based Simulation For Cyber-Physical Attacks On Smart Buildings	Rahul Agarwal, Na Meng, Xinghua Gao, Yuqing Liu
Room:	ISR-30	Smart Building Conceptualization: A Comparative Analysis Of Literature And Standards	Alireza Borhani, Atieh Borhani, Carrie Sturts Dossick, Julie Jupp
Potomac 6	ISR-39	Measurement And Verification And Model Validation To Evaluate Energy And Demand Savings From Smart Building Technologies In A Residential, Controlled Laboratory	Yiyi Chu, Debrudra Mitra, Kristen Cetin
	ISR-48	Digital Twin Cities: Data Availability And Systematic Data Collection	Michael Jacobellis, Mohammad Ilbeigi

**Saturday March 12, 2022**  
**Session 9: 8:15 am - 9:15 am**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Amirhosein Jafari

	CAS-51	Virtual Reality For Enhancing Safety In Construction	Ibrahim Abotaleb, Ossama Hosny, Khaled Nassar, Sahar Bader, Mohamed Elrifaae, Salma Ibrahim, Yasmin El Hakim, Mohamed Sherif
Room: Arlington	CAS-05	Design And Development Considerations For Construction Virtual Reality Training Modules: A Case Study	Saeed Rokooei, Alireza Shojaei, Amin Alvanchi, Reza Azad
	CAS-30	Perceptions Of Augmented And Virtual Reality Technologies Adoption Within The AEC Industry	Vahid Balali, Xiang Guo, Soheil Fathi, Arsalan Heydarian
	CAS-79	Semi-Automated Generation Of 3D Bridge Models From 2D PDF Bridge Drawings	Temitope Akanbi, Jiansong Zhang

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Yelda Turkan

	ADT-33	Non-Intrusive Method For Capturing Occupant Thermal Discomfort Cues And Profiles In Buildings	Nidia Ines Bucarelli, Nora El-Gohary
Room: Fairfax	ADT-36	Early-Stage Advisory System For Energy-Conscious Design Of Building Facade Systems	Bahram Abediniangerabi, Mohsen Shahandashti
	ADT-05	A Shearlet Transform-Based Method For Automated Rebar Recognition Using GPR B-Scan Image Data	Zhongming Xiang, Ge Ou, Abbas Rashidi, Ali H. Mashhadi
	ADT-70	Temporary Traffic Control Device Detection For Road Construction Projects Using Deep Learning Application	Kyubyung Kang, Donghui Chen, Kwangcheol Kim, Dan Koo, Myungjin Chae, Sungchul Seo, Hyung-Keun Park

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: JungHo Jeon

	ISR-78	Construction Assessment Framework Of Electrical Transmission Structures From Decommissioned Wind Turbine Blades	Yulizza Henao, Russell Gentry, Tristan Al-Haddad, Lawrence C. Bank, John E. Taylor
Room: Prince William	ISR-99	Constructing Electric Conductive Pavement Using A More Sustainable Method	Mohamed Abdel Raheem, Mohammad Anis
	ISR-126	Online Engagement Of Facility Users In Rehabilitation Decision Making	Ahmed Attalla, Tamer El-Diraby
	ISR-121	Experimental Study Of Mechanical Connectors For Application In Rebar Cages	Masood Vahedi, Hamed Ebrahimian, Ahmad Itani

**Saturday March 12, 2022**  
**Session 10: 9:30 am - 10:30 am**

**Track 1: Engineering and Materials Design, Quality, and Value Management**

Track Chair: Hala Sanboskani

Room: Potomac 1	EQV-14	Exploring Utilization Of The 3D Printed Housing As Post-Disaster Temporary Shelter For Displaced People	Karthik Subramanya, Sharareh Kermanshachi
	EQV-24	A Framework For Estimating The Re-Use Value Of In-Situ Building Materials	Aida Mollaei, Chris Bachmann, Carl Haas
	EQV-05	Developing A Value Dashboard For Tracking Value Alignment During Design	Salam Khalife, Farook Hamzeh
	EQV-11	Examination Of Contractor Quality Control Plans For Highway Construction Projects	Mamdouh Mohamed, Dan Tran

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Gaang Lee

Room: Potomac 2	HSW-44	The Impact Of COVID-19 Pandemic On Construction Labor Force And Performance Metrics: A Case For Automation	Olugbenro Ogunrinde, Ifeanyi Udodilim Okpala, Muhammad Tyseer Hatamleh, Opeyemi Oyeyipo, Rapheal Abiodun Ojelabi
	HSW-30	Smart Robotic System To Fight The Spread Of COVID-19 At Construction Sites	Jonathan Seagers, Yizhi Liu, Houtan Jebelli
	HSW-103	Development Of Strategies To Improve Health And Safety Of Women In Construction Industry: A Delphi Method	Apurva Pamidimukkala, Sharareh Kermanshachi
	HSW-52	Measures To Boost Mental Health In The Construction Industry: Lessons From The Nigerian Workplace	Janet Mayowa Nwaogu, Albert P. C. Chan

**Track 3: Automation in Construction**

Track Chair: Yang (Gilbert) Ye

Room: Potomac 3	AIC-68	Application Of Concrete 3D Printing For Bridge Construction: Current Challenges And Future Directions	Seyedeh Sara Miryousefi, Ali Kazemian, Amirhosein Jafari
	AIC-38	Exploring Human-Machine Interfaces For Teleoperation Of Excavator	Jin Sol Lee, Youngjib Ham
	AIC-06	Integrating Ai In An Audio-Based Digital Twin For Autonomous Management Of Roadway Construction	Anisha Deria, Yong-Cheol Lee, Pedram Ghannad
	AIC-12	Digital Twin In Construction Safety And Its Implications For Automated Monitoring And Management	Moeid Shariatfar, Anisha Deria, Yong-Cheol Lee

**Track 4: Project and Organizational Management and Planning**

Track Chair: Michaela LaPatin

Room: Potomac 4	PMP-08	A Framework To Measure The Cost Of Controversy Surrounding Energy Construction Projects	Michaela Lapatin, Lauryn Spearing, Helena Tiedmann, Olga Kavvada, Maria Giorda, Jean Daniélou, Kasey M. Faust
	PMP-70	Identification Of Management Processes That Impact Capital Efficiency On Downstream And Chemical Projects	Zhe Yin, Carlos Caldas, Daniel De Oliveira
	PMP-01	Mapping The Preconstruction Project Development Process For Transportation Projects	Tanin Ahmad Haidary, Dennis C. Bausman, Ajay S. Jadhav, Mashrur Chowdhury
	PMP-16	Making Project Risk Response Decisions Through Stakeholders' Impact On Project Risk Interaction	Zhixue Liu, Ronggui Ding, Lei Wang, Rui Song, Xinyi Song

**Track 5: Construction Scheduling, Estimating, Economics, and Controls**

Track Chair: Azita Morteza

Room: Potomac 5	CEC-05	Determination Of Optimal Rolling Planning Period For The Management Of BIM-Based Construction Supply Chain Processes	Qian Chen, Borja Garcia De Soto, Bryan T. Adey
	CEC-33	Building Optimization Model For Minimizing Operation And Maintenance Costs	Mahdi Ghafoori, Moatassem Abdallah
	CEC-34	Estimating Electricity Consumption Of Buildings Using Information Theory And Machine Learning Methods	Mahdi Ghafoori, Moatassem Abdallah
	CEC-43	Linear Optimization Model For Scheduling Repetitive Construction Projects With Multiple Crews	Shahryar Monghasemi, Moatassem Abdallah

**Track 6: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Shantanu Kumar

Room: Potomac 6	ISR-110	Development Of Innovative Strategies To Enhance The Resilience Of The Critical Infrastructure	Thahomina Jahan Nipa, Sharareh Kermanshachi, Karthik Subramanya
	ISR-03	A Web-Based System To Optimize Project Waste Management Decisions	Boushra Barakat, Issam Srour
	ISR-14	Transportation Asset Data Management: BIM As A Holistic Data Management Approach	Ashtarout Ammar, Gabriel Dadi, Hala Nassereddine
	ISR-68	Evaluating Management Risks In Megaprojects: Case Of International Defense Construction	M. Scott Stanford, Evan Dicks, Patrick Suermann

**Saturday March 12, 2022**  
**Session 10: 9:30 am - 10:30 am**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Qi (Judy) Zhu

	CAS-81	Digital Civil Infrastructure And Why Is It Important For Transportation Agencies?	Hani Alzraiee, Jessica Mcarthur, William Francis Killmond
Room: Arlington	CAS-03	The Effects Of UAV-Captured Image Degradation Issues On The Quality Of 3D Reconstruction	Dhakshna B Morthy, Yiqing Liu, Justin Ker-Wei Yeoh
	CAS-08	Facilitating Smart Contract In Project Scheduling Under Uncertainty - A Choquet Integral Approach	Chuanni He, Min Liu, Zhigao Wang, Gongfan Chen, Yuxiang Zhang, Simon M. Hsiang
	CAS-13	Integrating 4D BIM And FDS To Simulate And Assess Fires In Buildings Under Construction	Qi Sun, Yelda Turkan, Erica Fischer

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Yajie Liu

	ADT-40	Construction Worker Ergonomic Assessment Via LSTM-Based Multi-Task Learning Framework	Jiannan Cai, Xin Li, Xiaoyun Liang, Wei Wei, Shuai Li
Room: Fairfax	ADT-41	Evaluation Of UAS Flight Configuration Factors And Their Impacts On Photogrammetric Survey Accuracy	Yajie Liu, Kevin Han, William Rasdorf
	ADT-49	Deep Learning-Based Relation Extraction From Construction Safety Regulations For Automated Field Compliance Checking	Xiyu Wang, Nora El-Gohary
	ADT-54	Digital Safety Planning And Monitoring On Highway Construction Project	Hani Alzraiee, Tong Goh

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Karen Gupta

	ISR-19	Connecting Pre-Existing Characteristics Of Water Utilities To Impacts During The COVID-19 Pandemic	Lauryn Spearing, Nathalie Thelemaque, Felipe Araya, Jessica Kaminsky, Kasey Faust
Room: Prince William	ISR-47	Using Wastewater Flow To Understand Water System's Demand Behavior During COVID-19 Pandemic In An Urban Metropolitan City In Texas	Amal Bakchan, Arkajyoti Roy, Kasey M. Faust
	ISR-58	Water Utilities And The COVID-19 Pandemic: A Review Of Pandemic-Related Research	Nathalie Thelemaque, Lauryn Spearing, Kasey Faust, Jessica Kaminsky
	ISR-77	Managing Leakages In Intermittent Water Supply Systems: The Role Of Network Zoning And Supply Scheduling	Saad Aljadhai, Abdulrahman Bin Mahmoud Bin Mahmoud

**Saturday March 12, 2022**  
**Session 11: 11:00 am - 12:00 pm**

**Track 1: Advanced Technologies and Data Analytics**

Track Chair: Chau Le

	ADT-63	A Natural Language Processing-Based Approach For Clustering Construction Projects	Chau Le, Taewoo Ko, H. David Jeong
Room:	ADT-12	Forecasting Field Production Using Machine Learning Time Series	Johnny Sawma Awad, Issam Srour, Bassel Safa, Sena Assaf
Potomac 1	ADT-25	#COVID-19: Understanding Construction Industry Responses On Twitter In The Emergence Of Novel Coronavirus	Priyanka Linge, M Ahmed Rusho, Md Ashraf Ahmed, Arif Mohaimin Sadri
	ADT-68	E-Ticketing Technology In Construction Projects: Adoption, Benefits, And Challenges	Karthik Subramanya, Sharareh Kermanshachi

**Track 2: Health, Safety, and Workforce Issues**

Track Chair: Shiva Pooladvand

	HSW-21	Reducing Harassment For Women In The Professional Construction Workplace With Zero-Tolerance And Interventionist Policies	Candice Sexton, Jiansong Zhang
Room:	HSW-37	Occupational Health And Safety Challenges In Construction Industry: A Gender-Based Analysis	Apurva Pamidimukkala, Sharareh Kermanshachi
Potomac 2	HSW-69	Analysis Of Gender Perception In The Construction Sector: Colombian Case.	Cristian Camilo Osorio Gómez, Marieth Stephany Castro Forero, Candice Starr Sexton, Jiansong Zhang, Lina Verónica Zuluaga Botero
	HSW-76	A Gender Analysis Of Construction Executive Career Path Progression Using LinkedIn Data	Paul J. Hickey, Veronica Hercules Villeda, Adam Johnson, Abdolmajid Erfani, Qingbin Cui

**Track 3: Computer Applications, Information Modeling, and Simulation**

Track Chair: Vartenie Aramali

	CAS-34	Construction Site Segmentation Using Drone-Based Ortho-Image And Convolutional Encoder-Decoder Network Model	Yuhan Jiang, Sisi Han, Yong Bai
Room:	CAS-52	Augmented Reality Communication On Active Construction Sites: A Pilot Study Exploring Non-Technological Factors	Rita El Kassis, Steven Ayer, Mounir El Asmar, Pingbo Tang
Potomac 3	CAS-55	Adaptation Of A Contractor's Risk Behavior In A Competitive Bidding Environment	Rita Awwad, Wiam El Irani
	CAS-57	Earthwork Surface Creation And Volume Computation Using UAV 3D Mapping	Nickolas Villalobos, Hani Alzraiee

**Track 4: Project and Organizational Management and Planning**

Track Chair: Houtan Jebelli

	PMP-18	Understanding And Comparing The Different Fund Levels In Airport Improvement Program Projects: A Graph Theory Approach	Ramy H. Khalef, Islam El-Adaway
Room:	PMP-23	Improved Project Planning Strategies For Transportation Assets: The Necessity Of Early Stakeholder Involvement	Katherine Maslak Madson, Bukola Oni
Potomac 4	PMP-36	A Pre-Demolition Planning Framework To Balance Recyclability And Productivity	Hiba Jalloul, Ana Daniela Pinto, Juyeong Choi
	PMP-62	Project Team Collaborations During Time Of Disruptions: Transaction Costs, Knowledge Flows, And Social Network Theory Perspective	Hasan Gokberk Bayhan, Sinem Mollaoglu, Hanzhe Zhang, Kenneth A. Frank

**Track 5: Construction Scheduling, Estimating, Economics, and Controls**

Track Chair: Yizhi Liu

	CEC-09	Machine Learning Framework To Predict Last Planner System Performance Metrics	Lynn Shehab, Diana Salhab, Elyar Pourrahimian, Karim Noueihed, Gunnar Lucko, Farook Hamzeh
Room:	CEC-45	A Rating Score For Assessing The Risks And Challenges Associated With Modular Construction	Mohamad Abdul Nabi, Islam El-Adaway
Potomac 5	CEC-44	Benefits Of Building Information Modeling In Road Projects For Cost Overrun Factors Mitigation	Omar Sánchez, Karen Castaneda, Rodrigo F. Herrera, Eugenio Pellicer

**Track 6: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Lauryn Spearing

	ISR-10	A Framework For Evaluating Societal Impacts Caused By Disruptions To Inland Waterways	Katherine Maslak Madson, Jennifer Lather
Room:	ISR-15	Framework For Measuring Infrastructure Vulnerability And Resiliency Of Communities During A Flood Disaster	Anisha Deria, Yong-Cheol Lee, Pedram Ghannad
Potomac 6	ISR-107	Analysis Of The Resilience Management Dimensions Based On Project Complexity Level	Thahomina Jahan Nipa, Sharareh Kermanshachi, Ronik Ketankumar Patel
	ISR-108	Analysis Of Investment Decision-Making Factors In Resilience Improvement Of Transportation Infrastructures	Thahomina Jahan Nipa, Sharareh Kermanshachi, Sanjgna Karthick

**Saturday March 12, 2022**  
**Session 11: 11:00 am - 12:00 pm**

**Track 7: Computer Applications, Information Modeling, and Simulation**

Track Chair: Pengxiang Xia

Room:	CAS-15	Semi-Automated Conversion Of 2D Orthographic Views Of Wood Building Components To 3D Information Models	Temitope Akanbi, Oscar Wong Chong, Jiansong Zhang
Arlington	CAS-16	Interactive Visual Representation Of Inter-Connected Requirements In Building Codes	Xiaorui Xue, Jiansong Zhang, Nora El-Gohary
	CAS-17	Analyzing The Impact Of COVID-19 Pandemic Risks On Construction Projects In Developing Countries: Case Of Iraq	M.K.S. Al-Mhdawi, Mario Brito, Bhakti Stephan Onggo, Hatim A. Rashid
	CAS-20	Desktopeye: A Desktop-Based Eye-Tracking System For 3D Model Review Analysis	Yangming Shi, Jing Du

**Track 8: Advanced Technologies and Data Analytics**

Track Chair: Sogand Hasanzadeh

Room:	ADT-62	Feasibility Assessment And Enhancement Of TOF-Based UWB RTLS For Non-Line-Of-Sight Conditions On Construction Sites	Tian Jin, Farnaz Sadeghpour
Fairfax	ADT-26	A Framework For EEG-Based Ubiquitous Hazard Identification And Proactive Safety Management	Jungho Jeon, Hubo Cai
	ADT-74	Early Pilot Deployment Of A Decision-Making Framework To Select Wearable Internet Of Things Devices For Safety On Construction Sites	Ibukun Awolusi, Tulio Sulbaran
	ADT-82	Worker Safety And Health Activity Monitoring In Construction Using Unmanned Aerial Vehicles And Deep Learning	Ibukun Awolusi, Aliu Akinsemoyin, Debaditya Chakraborty, Ahmed Al-Bayati

**Track 9: Infrastructure Systems, Sustainability and Resilience**

Track Chair: Ricardo Eiris

Room:	ISR-75	Comparing Impacts Of Indoor Environmental Quality Factors On Satisfaction Of Occupants With Different Genders And Ages Between Office- And Home-Based Work Environments	Xingzhou Guo, Yunfeng Chen
Prince William	ISR-66	Impacts Of The COVID-19 Pandemic On Services Utilization And Energy Consumption In Healthcare Facilities: Evidence From Shanghai Municipal Hospitals	Yongkui Li, Lingyan Cao, Jiansong Zhang, Yi Jiang
	ISR-44	Understanding COVID-19's Impacts On Multi-Sector Stakeholder Values On Housing Resilience	José E. Velázquez-Díaz, Parasar Gosain, N. Emel Ganapati, Lu Zhang
	ISR-97	Analyzing The Resilience Of Construction Firms Through Resilience Indicators	Sai Akhila Boddi Reddy, Ingrid Arocho