



The 8th World Conference on Structural Control & Monitoring (8WCSCM)

5-8 JUNE 2022, ORLANDO, FLORIDA, U.S.A.



University of Central Florida (UCF)

US Panel of IASCM



CONTENTS

Chairs' Welcome	04
Advisory Board	06
Conference Chairs	06
IASCM US Panel	06
Local Organizing Committee	07
International Scientific Committee	07
General Information	08
Attractions	10
Venue Map	12
Program at a Glance	14
Program by Sessions	15
Keynote Sessions	18
Breakout Sessions	27
Mini- Symposia	42
Sponsors	45
Note	47

Chairs' Welcome

Welcome to the Eighth World Conference on Structural Control and Monitoring (8WCSCM) in Orlando, the City Beautiful.

The University of Central Florida (UCF) in collaboration with the U.S. Panel of the International Association for Structural Control and Monitoring (IASCM) are the organizers of the international conference. The host organization is the International Association for Structural Control and Monitoring (IASCM) which has the main objective of promoting international cooperation in the fields of structural control and monitoring by organizing conferences and workshops. The international conferences have been hosted every four years by the International Association for Structural Control and Monitoring (IASCM) since 1994. The preceding conferences have been held in Pasadena - USA (1994), Kyoto - Japan (1998), Como - Italy (2002), La Jolla - USA (2006), Tokyo - Japan (2010), Barcelona – Spain (2014), and Qingdao - China (2018). These world conferences have encompassed all aspects of structural control and monitoring for a variety of civil, mechanical, aerospace and energy systems. Subjects that have been discussed at these conferences over the years include smart sensing technologies, algorithms for damage detection, parameter identification and model topics such as updating, theories for condition assessment, safety evaluation and reliability analysis, structural control devices and systems, hybrid simulation and various testing technology, control algorithms, integration techniques of structural health monitoring systems, structural monitoring and control systems, and the practice of structural monitoring and control techniques for different applications.

The 8WCSCM will also cover all major related topics, including smart control and sensing devices; smart and multi-functioning materials; important infrastructures, such as bridges, buildings, tunnels, road and rail structures; wind, earthquake and multi-hazards issues; Bayesian inference and uncertainty quantification; life-cycle assessment; machine-learning and computer-vision applications; artificial intelligence, digital twins; smart cities, smart tourism and resilient communities; recent research advances; and more. The program has 8 keynotes from prominent researchers from 7 different countries and 4 continents, 39 breakout sessions with several special sessions organized by experts, several technical sessions in thematic areas (252 papers from 41 countries and 5 continents), and 2 mini-symposia with contributors from academia, industry, and government.

The full technical submissions will be compiled for publication as Springer Proceedings papers within the Book series as International Conference Proceedings Series: the 8th World Conference on Structural Control and Monitoring (8WCSCM). The extended abstracts will be made available to the major indexing services such as Web of Science, Scopus, Google Scholar. The Springer Conference Proceedings papers will be published soon after 8WCSCM.

Since 2019, our world has been shocked by COVID19 pandemic. The effects of the global pandemic have been observed in anything we do and how we carry out our lives. As one of the most prominent confer-

ences in the interdisciplinary field of structural control and monitoring, we decided to create opportunities to meet in person and virtually to exchange ideas to contribute to the body of knowledge with our novel work even during the global pandemic. The 8WCSCM will be held as a hybrid conference in its almost 30-year history. This hybrid conference will bring participants flexibility from distance, time, medical and financial limitations. The conference has a rich past and diverse participations from all around the world. The collective objective is to provide novel technical solutions for smart and resilient systems in a sustainable society in today's technologically fast-paced world with many other issues such as health, sustainability, economic hardships, conflicts, and social justice.

We also would like you to enjoy one of the tourism centers of the world. As the nation's #1 visitors' destination, on-site participants have numerous choices of lodging, resorts, and restaurants in and around the City of Orlando. Disney World, Universal Studios, and many other theme parks are conveniently located near the conference venue. Orlando has been awarded two Smart Cities awards and is currently pursuing a variety of additional projects for Smart Cities initiatives that would assist citizens and visitors. The Florida High Tech Corridor is a technology rich region known for space technologies and other high-tech clusters of innovation, such as modeling and simulation, optics and photonics, digital media, and medical technologies. NASA Kennedy Space Center, SpaceX, and Blue Origin are just about 50 miles away from the UCF Main Campus.

We thank you for joining us to explore solutions to engineering problems in the interdisciplinary field of Structural Control and Monitoring.

On behalf of the IASCM and the conference organizing committee, we warmly welcome you to the 8WCSCM.



Dr. Hae-Bum "Andrew" Yun
Chair of 8WCSCM, 2022
Associate Professor of
Civil, Environmental & Construction Engineering,
University of Central Florida



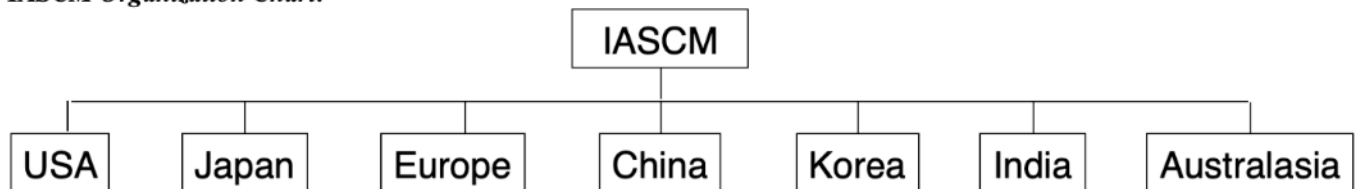
Dr. F. Necati Catbas
Chair of 8WCSCM, 2022
Lockheed Martin St. Laurent Professor
Civil, Environmental & Construction Engineering,
University of Central Florida

Orlando, Florida
June 2022

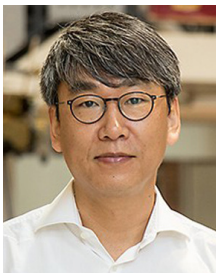
International Association for Structural Control & Monitoring (IASCM) Advisory Board

Hui Li (President)	Harbin Institute of Technology (China)
Andrew W. Smyth (Incoming President)	Columbia University (U.S.A.)
Sami F. Masri (Secretary General)	University of Southern California (U.S.A.)
Eleni Chazi	ETH Zurich (Switzerland)
Yozo Fujino	Josai University (Japan)
Esayas Gebreyohannes	Addis Ababa University (Ethiopia)
Akira Igarashi	Kyoto University (Japan)
Yoshiki Ikeda	Kyoto University (Japan)
Lukas Jankowski	IPPT PAN (Poland)
Ho-Kyung Kim	Seoul National University (South Korea)
Chan Ghee Koh	National University of Singapore (Singapore)
Michael Krommer	Johannes Kepler University Linz (Austria)
Jerome P. Lynch	Duke University (U.S.A.)
Yi-Qing Ni	Hong Kong Polytechnic University (Hong Kong)
Akira Nishitani	Waseda University (Japan)
José Rodellar	Technical University of Catalonia (Spain)
Bijan Samali	Western Sydney University (Australia)
Gopalakrishnan Srinivasan	Indian Institute of Science (India)
David Wagg	University of Sheffield (U.K.)
Daniele Zonta	University of Trento (Italy)

IASCM Organization Chart:



Conference Chairs



Dr. Hae-Bum "Andrew" Yun
University of Central Florida



Dr. F. Necati Catbas
University of Central Florida

IASCM US Panel

Andrew Smyth (Chair)	Columbia University	Mohammad Jahanshahi	Purdue University
F. Necati Catbas	University of Central Florida	Sami Masri	University of Southern California
Genda Chen	University of Missouri	Haeyoung Noh	Stanford University
Richard Christenson	University of Connecticut	Hae-Bum Yun	University of Central Florida

Local Organizing Committee

Georgios Apostolakis	University of Central Florida	Joe Kider	University of Central Florida
F. Necati Catbas	University of Central Florida	Wen Shen	University of Central Florida
Chinwendu Enyioha	University of Central Florida	Patrick Sun	University of Central Florida
Arthur Huang	University of Central Florida	Hae-BumYun	University of Central Florida
Jeffrey Kauffman	University of Central Florida		

International Scientific Committee (ISC)

Ahmet Aktan	Drexel University (U.S.A.)	Sami Masri	University of Southern California (U.S.A.)
Ninel Alver	Ege University (Turkey)	Akira Mita	Keio University (Japan)
James Beck	California Institute of Technology (U.S.A.)	Carlos Moutinho	Universidade do Porto (Portugal)
Ayech Benjeddou	Institut Supérieur de Mécanique de Paris (SupMéca) (France)	Satish Nagara-jalah	Rice University (U.S.A.)
Christian Boller	Universität des Saarlandes (Germany)	Yi-Qing Ni	The Hong Kong Polytechnic University (Hong Kong)
Joan Casas	Universitat Politècnica de Catalunya (Spain)	Jin-Ping Ou	Harbin Institute of Technology (China)
F. Necati Catbas	University of Central Florida (U.S.A.)	Baki Ozturk	Hacettepe University (Turkey)
Genda Chen	Missouri S&T (U.S.A.)	Costas Papadim- itriou	University of Thessaly (Greece)
Shirley Dyke	Purdue University (U.S.A.)	Kitae Park	Korea Institute of Civil Engineerinand Building Technology (South Korea)
Lucia Faravelli	University of Pavia (Italy)	Francesc Pozo	Universitat Politècnica De Catalunya (Spain)
Charles Farrar	Los Alamos National Laboratory (U.S.A.)	Paul Reynolds	FSD Active Limited (U.K.)
Spilios Fassois	University of Patras (Greece)	José Rodellar	Universitat Politècnica de Catalunya (Spain)
Mustafa Gul	University of Alberta (Canada)	Bijan Samali	Western Sydney University (Australia)
Hong Hao	Curtin University (Australia)	Jeffery Scruggs	University of Michigan (U.S.A.)
Akira Igarashi	Kyoto University (Japan)	Kenichi Soga	UC Berkeley (U.S.A.)
Jose Inaudi	National University of Cordoba (Spain)	Hoon Sohn	Kaist University (South Korea)
Daniel Inman	University of Michigan (U.S.A.)	Gopalakrishnan Srinivasan	Indian Institute of Science, Bengaluru (India)
Lukasz Jankowski	Polish Academy of Sciences (Poland)	Izuru Takewaki	Kyoto University (Japan)
Erik Johnson	University of Southern California (U.S.A.)	Fabrizio Vestroni	Sapienza University of Rome (Italy)
Ahsan Kareem	University of Notre Dame (U.S.A.)	David Wagg	University of Sheffield (U.K.)
Il-Bum Kwon	Korea Research Institute of Stan- dards and Science (South Korea)	Zhi-Shen Wu	Ibaraki University (Japan)
Wei Hsin Liao	The Chinese Unibersity of Hong Kong	You-Lin Xu	The Hong Kong Polytechnic University (Hong Kong)
Francisco Lopez- Almansa	Universitat Politècnica de Catalunya (Spain)	Chung-Bang Yun	Zhejiang University (China)
Xi-Lin Lu	Tongji University (China)	Hae-Bum Yun	University of Central Florida (U.S.A.)

**Date:**

June 5, 2022 (Sunday) - June 8, 2022 (Wednesday)

**Venue:**

The 8WCSCM will be hosted on UCF Rosen College of Hospitality Management campus (Rosen campus). The campus is located approximately 30 miles from the UCF main campus and conveniently set in the heart of Orlando's tourism district, placing world-renown industry organizations and businesses within minutes of the specially-designed, resort-style campus.



Tel.: +1(407) 823-0176

Email.: secretariat@8wcscm.org

Address: UCF Rosen College of Hospitality Management.
9907 Universal Blvd, Orlando, FL 32819

**Weather:**

In Orlando, Florida, in June, the average temperature ranges is 23.4°C to 31.8°C

**Language:**

The official language is English. Simultaneous interpretation is available for opening ceremony, keynote sessions and closing ceremony.

Registration Desk Opens

Date	Time	Location
June 5, 2022	10:00 am - 19:00 pm	UCF Rosen College of Hospitality Management Campus
June 6, 2022	8:00 am - 19:00 pm	
June 7, 2022	8:00 am - 19:00 pm	
June 8, 2022	8:00 am - 19:00 pm	



Wifi Name: UCF_Guest (without password)
Instructions: If you are a guest, you should connect to "UCF_Guest" for wireless service. Once you are connected on the "UCF_Guest" network open a web browser, read UCF's Acceptable Use policy and click accept at the bottom of the page.

Lunch

Date: June 6 & 7, 2022
Time: 12:15 - 13:00 pm
Location: UCF Rosen College of
Hospitality Management campus
Room 124

Welcoming Reception

Date: June 6, 2022
Time: 18:30pm- 20:00 pm
Location: UCF Rosen College of
Hospitality Management campus
Room 126

Date: June 7, 2022

Time: 6:30 pm - 8:30 pm
Location: UCF Rosen College of
Hospitality Management campus
Room 124

In-person & Virtual presentations:

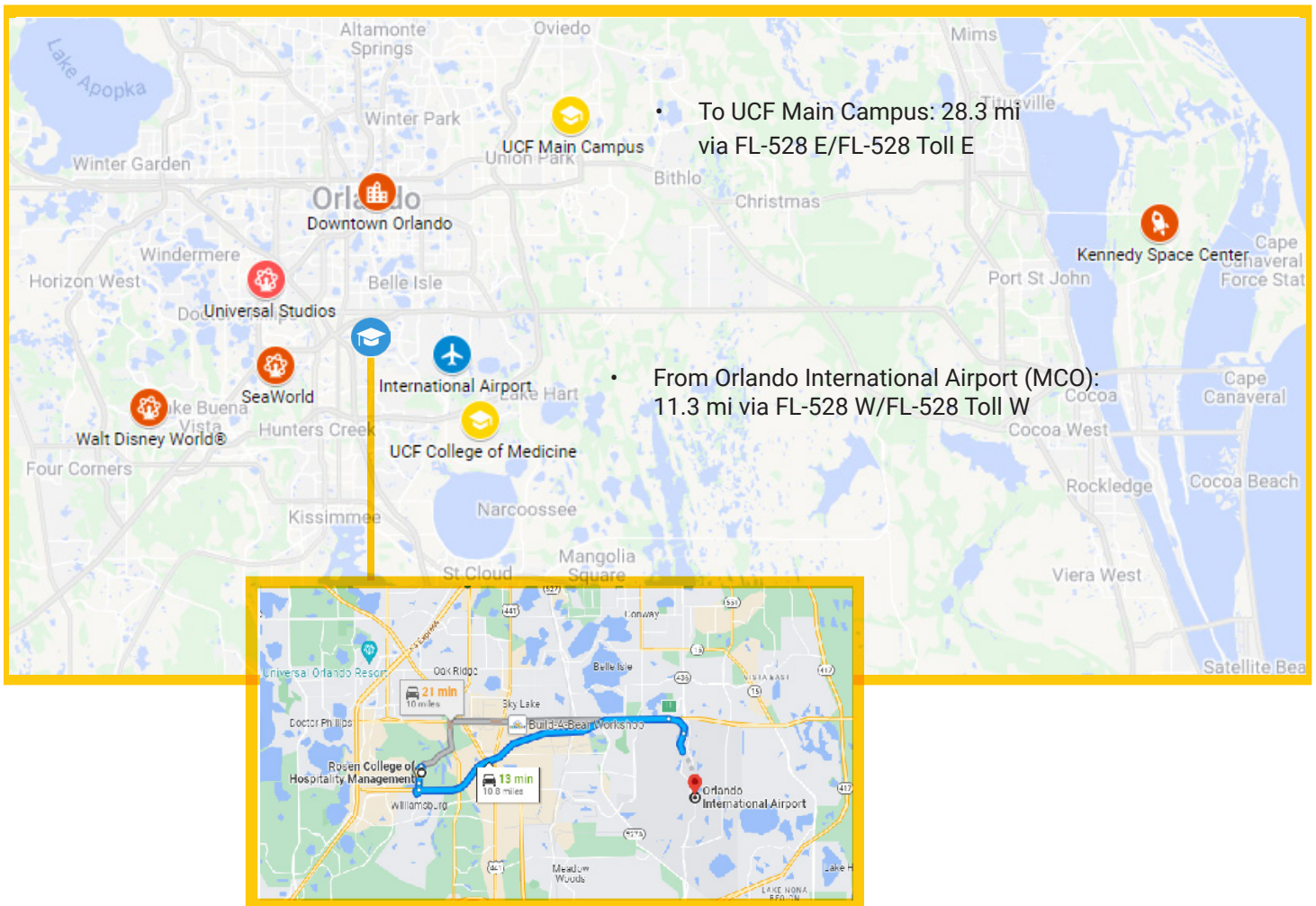
As a hybrid conference, we ask all virtual participants to upload max 15-min pre-recorded presentations to the website by May 27 (Fri). Live presentations will not be accepted to minimize technical problems due to a presenter's local network condition. During the session, your pre-recorded presentation will be played, and you can answer questions from audiences synchronously at the end of your presentation.



Orlando Attractions

The City of Orlando is full of attractions, both touristically and technically

The 8WCSCM will be hosted on UCF Rosen College of Hospitality Management campus (Rosen campus). The campus is located approximately 30 miles from the UCF main campus and conveniently set in the heart of Orlando's tourism district, placing world-renown industry organizations and businesses within minutes of the specially-designed, resort-style campus. The distances to popular local attractions are:



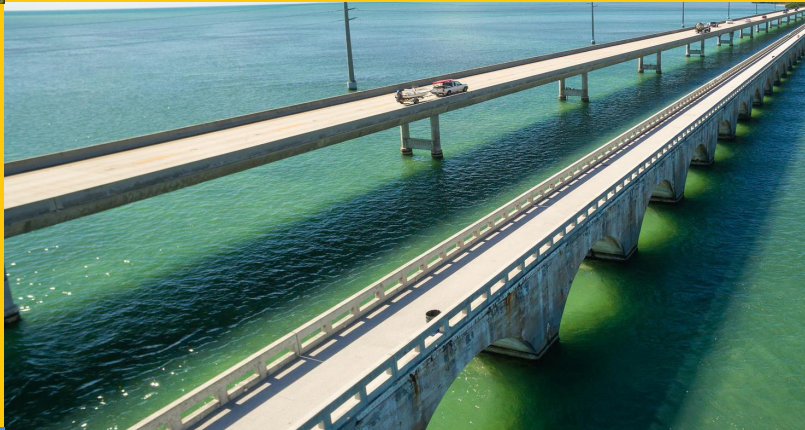
The campus has an auditorium for 400 people, courtyard for 500 people, board meeting rooms, many AV-equipped classrooms for parallel technical sessions, computer labs for technical tutorial and demo, dining rooms, beer & wind labs, etc. Thus, the venue can facilitate technical meetings, dining, and social events in one place.

You can find various lodging options, including many award winning Orlando hotels and family/vacation hotels. For more details, please check the hotel list in Lodging. It is highly recommended to reserve your room(s) due to the popularity of the area by many tourists.



- **To Kennedy Space Center:** 11 mi via FL-528 E/FL-528 Toll E

The John F. Kennedy Space Center is located on Merritt Island, Florida. It is one of the ten field centers of National Aeronautics and Space Administration's (NASA).



- **To Key West:** 385.5 mi via US-1 S and Florida's Turnpike

The Seven Mile Bridge is a bridge in the Florida Keys. It connects Knight's Key (part of the city of Marathon, Florida) in the Middle Keys to Little Duck Key in the Lower Keys.



- **To Orlando Downtown:** 14.4 mi via I-4 E

Downtown Orlando is the historic core and central business district of Orlando, Florida.

- **To Universal Studio:** 7.4 mi via I-4

Universal Orlando consists of two theme parks (Universal Studios Florida and Universal's Islands of Adventure), an on-site waterpark (Volcano Bay), and an on-site entertainment district (Universal CityWalk).







- **To Disney World:** 7.6 mi via I-4 W

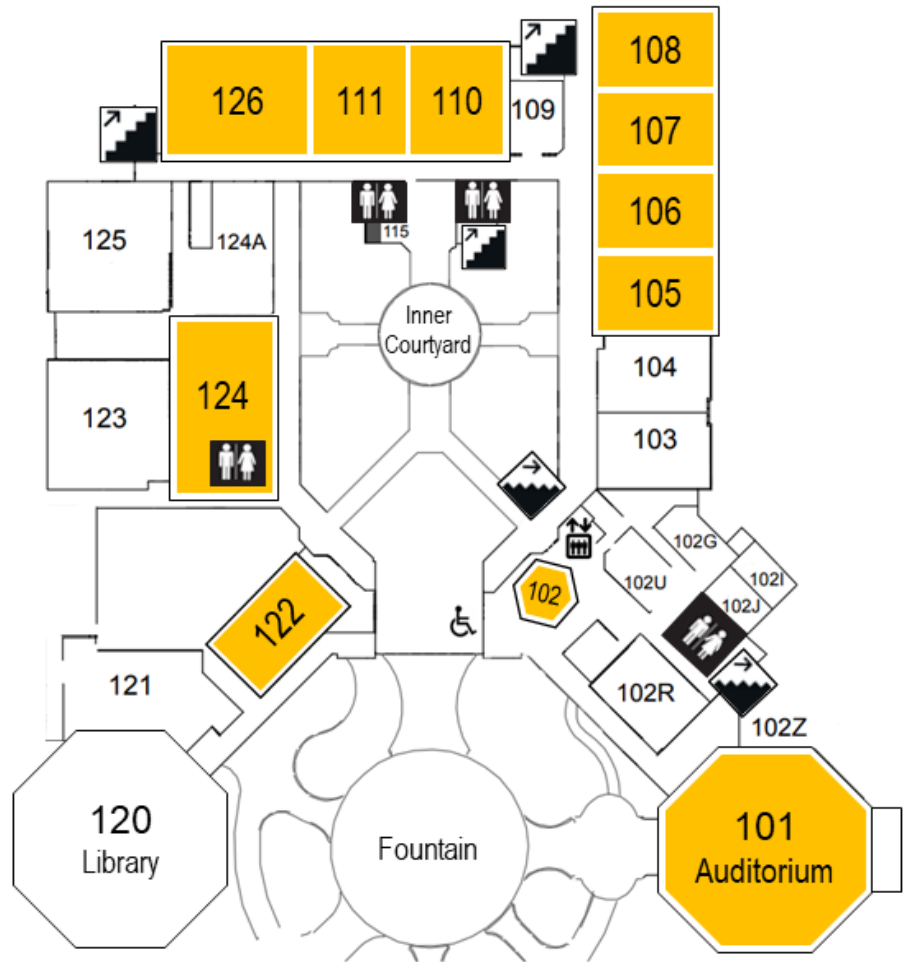
Disney World comprises four theme parks (Magic Kingdom, Epcot, Disney's Hollywood Studios, and Disney's Animal Kingdom), two water parks (Disney's Blizzard Beach and Disney's Typhoon Lagoon), and other entertainment venues, including the outdoor shopping center Disney Springs.

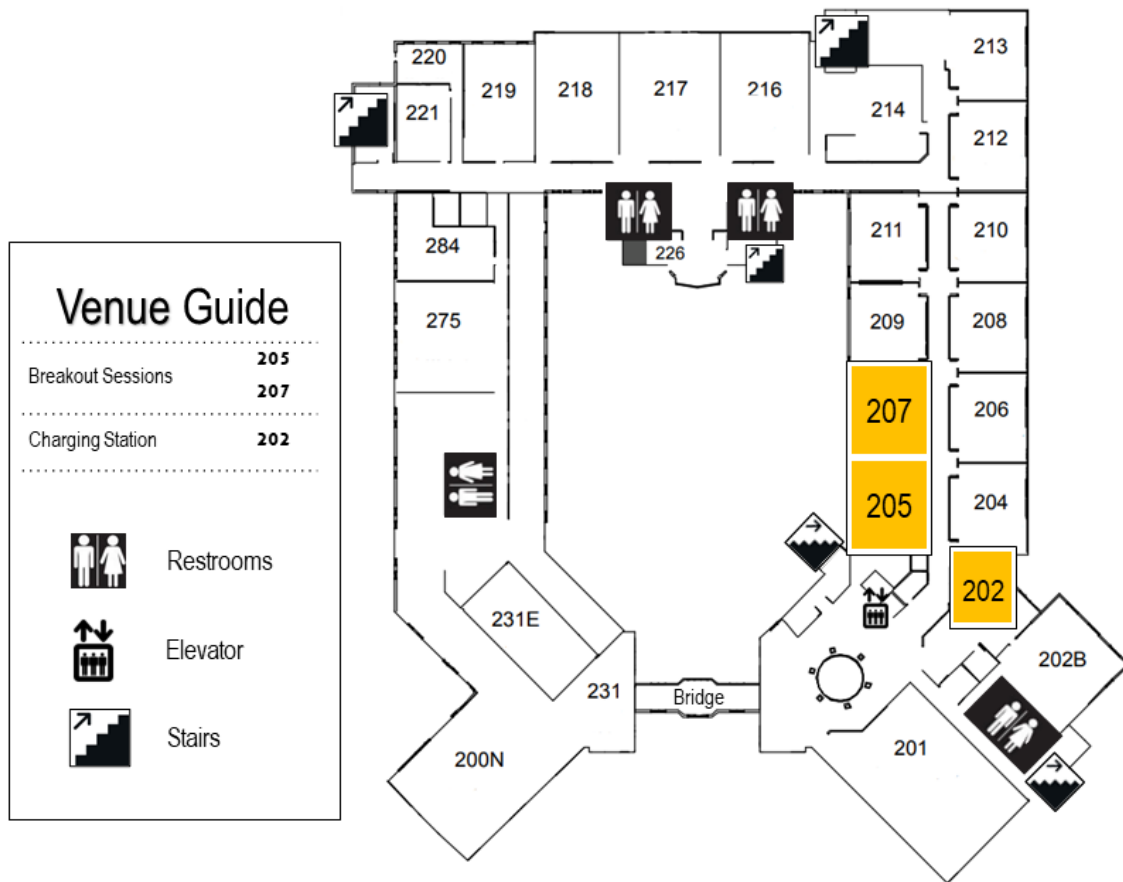
VENUE PLAN

in UCF Rosen College of Hospitality Management Campus

Venue Guide	
Keynote Sessions	101
Mini Symposia	101
Breakout Sessions	105 - 108 110 - 111
Registration	101 Lobby
Lunch	124
Welcoming Reception	126
IASCM Award Ceremony & 8WCSCM Banquet	124
Charging Station	122
Coffee Break	102

	Restrooms
	Elevator
	Accessibility Entrance
	Stairs





Second Floor



Universal Blvd



Program at a Glance

JUNE 5 (SUNDAY)									
10:00 - 19:00	REGISTRATION OPEN Room 101 Lobby								
13:30 - 16:30	IASCM BOARD MEETING Room 102R								
JUNE 6 (MONDAY)									
08:00 - 19:00	REGISTRATION OPEN Room 101 Lobby								
08:30-08:55	CONFERENCE OPENING CEREMONY & DAY-1 OPENING Room 101								
08:55-10:30	KEYNOTE SESSION 1 Room 101								
10:30 - 10:40	COFFEE BREAK Room 102								
10:40-12:15	KEYNOTE SESSION 2 Room 101								
12:15 - 13:00	LUNCH Room 124								
13:00 - 15:15	SS-13-1 Room 207	SS-01-1 Room 205	SS-06-1 Room 105	SS-07-1 Room 106	RS-02 Room 107	RS-03 Room 108	RS-04 Room 110	RS-06 Room 111	MS-1 Room 101
15:15 - 15:30	COFFEE BREAK Room 102								
15:30 - 18:00	SS-13-2 Room 207	SS-01-2 Room 205	SS-06-2 Room 105	SS-07-2 Room 106	RS-11 Room 107	RS-05 Room 108	RS-14 Room 110	RS-17 Room 111	
18:30 - 20:00	8WCSCM WELCOMING RECEPTION Room 126								
JUNE 7 (TUESDAY)									
08:00 - 19:00	REGISTRATION OPEN Room 101 Lobby								
08:50-08:55	DAY-2 OPENING Room 101								
08:55-10:30	KEYNOTE SESSION 3 Room 101								
10:30 - 10:40	COFFEE BREAK Room 102								
10:40-12:15	KEYNOTE SESSION 4 Room 101								
12:15 - 13:00	LUNCH Room 124								
13:00 - 15:15	RS-16 Room 207	RS-19 Room 205	RS-26 Room 105	RS-28-1 Room 106	SS-02 Room 107	SS-09 Room 108	SS-10 Room 110	SS-12 Room 111	MS-2 Room 101
15:15 - 15:30	COFFEE BREAK Room 102								
15:30 - 18:00	RS-23 Room 207	RS-24 Room 205	RS-25 Room 105	RS-32 Room 106	RS-09 Room 107	RS-15 Room 108	RS-22 Room 110	SS-03 Room 111	
18:30 - 20:30	IASCM AWARD CEREMONY & 8WCSCM BANQUET Room 124								
JUNE 8 (WEDNESDAY)									
08:00 - 19:00	REGISTRATION OPEN Room 101 Lobby								
09:00 - 11:15	RS-12 Room 207	RS-01 Room 205	RS-20 Room 105	RS-28-2 Room 106	SS-15 Room 107	SS-04 Room 108	SS-14 Room 110		
11:15-11:30	COFFEE BREAK Room 102								
11:30-12:00	8WCSCM CLOSING CEREMONY Room 101								

Program by Sessions

JUNE 6 (MONDAY)				
KEYNOTE SESSION 1			TIME	LOCATION
KN 1-1			09:00:00-09:45:00	Room 101
Human Activity Recognition: Learning with Less Labels and Privacy Preservation				
Mubarak Shah (University of Central Florida)				
KN 1-2			09:45:00-10:30:00	Room 101
Smart and Resilient Extraterrestrial Habitats				
Shirley Dyke (Purdue University)				
KEYNOTE SESSION 2			TIME	LOCATION
KN 2-1			10:40:00-11:30:00	Room 101
The physics-based path to learning, monitoring and virtualizing dynamical systems				
Eleni Chatzi (ETH Zurich)				
KN 2-2			11:30:00-12:15:00	Room 101
Physics-informed machine learning and transfer learning for structural health monitoring and vibration control				
Yiqing Ni (The Hong Kong Polytechnic University)				
BREAKOUT SESSION A		TRACK	TIME	LOCATION
SS-13-1		1.1A	13:00:00 - 15:15:00	Room 207
Vibration-based Structural Health Monitoring and damage identification (Part I)				
(Maria Pina Limongelli, Kenneth J. Loh)				
SS-01-1		1.2A	13:00:00 - 15:15:00	Room 205
Harnessing Nonlinearities in Passive Control Systems (Part I)				
(Nicholas E. Wierschem, Zheng Lu)				
SS-06-1		1.3A	13:00:00 - 15:15:00	Room 105
New Advances in Enhanced Passive, Adaptive Passive, & Semi-active Vibration Control (Part I)				
(Chao Sun, Yan Zhang)				
SS-07-1		1.4A	13:00:00 - 15:15:00	Room 106
Computer vision and machine learning-based infrastructure monitoring and inspection (Part I)				
(Wei Song, Bill Spencer)				
RS-02		1.5A	13:00:00 - 15:15:00	Room 107
Structural Control of Bridges under Earthquake or Multiple Hazards				
(Mayuko Nishio, Baki OZTURK)				
RS-03		1.6A	13:00:00 - 15:15:00	Room 108
Seismic Isolation in Civil Engineering				
(Gaston Fermandois, Yaohua Yang)				
RS-04		1.7A	13:00:00 - 15:15:00	Room 110
Application and testing of new materials and techniques in semi-active vibration control				
(Patrick Sun, Sina Moosavi)				
RS-06		1.8A	13:00:00 - 15:15:00	Room 111
Wind Effects and Wind-Induced Vibration Control for Large-Scale Structures				
(Agathoklis Giaralis, Sunjoong Kim)				
BREAKOUT SESSION B		TRACK	TIME	LOCATION
SS-13-2		1.1B	15:30:00 - 18:00:00	Room 207
Vibration-based Structural Health Monitoring and damage identification (Part II)				
(Mustafa Gül, Arash Noshadravan)				
SS-01-2		1.2B	15:30:00 - 18:00:00	Room 205
Harnessing Nonlinearities in Passive Control Systems (Part II)				
(Jingjing Wang, Shujin Laima)				
SS-06-2		1.3B	15:30:00 - 18:00:00	Room 105
New Advances in Enhanced Passive, Adaptive Passive, & Semi-active Vibration Control (Part II)				
(Haifeng Wang, Amrit Verma)				
SS-07-2		1.4B	15:30:00 - 18:00:00	Room 106
Computer Vision and Machine Learning-based Infrastructure Monitoring and Inspection (Part II)				
(Dr. Jian Li, Yuequan BAO)				
RS-11		1.5B	15:30:00 - 18:00:00	Room 107
Recent Advances in Sensing Technology for Structural Health Monitoring				
(Jie Xu, Inad Alqurashi)				
RS-05		1.6B	15:30:00 - 18:00:00	Room 108
Flow Controls for Wind and Structural Engineering				
(Francesc Pozo, Dryver Huston)				
RS-14		1.7B	15:30:00 - 18:00:00	Room 110
Computer Vision-based Sensing and System Identification				
(Ho-Kyung Kim, Wei Song)				
RS-17		1.8B	15:30:00 - 18:00:00	Room 111
Bayesian Inference and Uncertainty Quantification in SHM: New Algorithms and Applications				
(Arash Noshadravan, Qiu Yu)				
MINI SYMPOSIUM 1			TIME	LOCATION
MS-1			13:00:00 - 14:30:00	Room 101
Building Research Careers in Structural Control and Monitoring				
(Panelists: Chuck Farrar, Mohammad Jahanshahi, Haeyoung Noh, Audrey Oliver Moderator: Hae-Bum "Andrew" Yun)				

JUNE 7 (TUESDAY)				
KEYNOTE SESSION 3			TIME	LOCATION
KN 3-1			09:00:00-09:45:00	Room 101
Active Thermography for Inspection, Monitoring and Control: From Technology Development to Commercialization				
Hoon Sohn (Korea Advanced Institute of Science and Technology (KAIST))				
KN 3-2			09:45:00-10:30:00	Room 101
The physical model of leak noise and leak detection of urban gas pipelines				
Jie Li (Tongji University)				
KEYNOTE SESSION 4			TIME	LOCATION
KN 4-1			10:40:00-11:30:00	Room 101
Digital Twins: The Next Phase of the AI Revolution?				
Mark Girolami (University of Cambridge)				
KN 4-2			11:30:00-12:15:00	Room 101
Development of scum geometrical monitoring beneath floating covers aided by UAV photogrammetry				
Wing Chiu (Monash University)				
BREAKOUT SESSION A		TRACK	TIME	LOCATION
RS-16		2.1A	13:00:00 - 15:15:00	Room 207
Structural Health Monitoring with Multi-Data				
(Wen Shen, Chul Min Yeum)				
RS-19		2.2A	13:00:00 - 15:15:00	Room 205
Uncertainty-Involved Structural Model Updating, Damage Assessment and Reliability Evaluation				
(Audrey Olivier, Marwan Debees)				
RS-26		2.3A	13:00:00 - 15:15:00	Room 105
Innovative Technologies for System Integration, SHM Application, and Structural Performance Assessment				
(Takehiko Asai, Matthew Bonney)				
RS-28-1		2.4A	13:00:00 - 15:15:00	Room 106
Application of Structural Health Monitoring techniques				
(Elham Eslami)				
SS-02		2.5A	13:00:00 - 15:15:00	Room 107
Incomplete-data-driven Structural Health Monitoring, Damage Detection, and Condition Assessment				
(Yang XU, Shiyang WEI)				
SS-09		2.6A	13:00:00 - 15:15:00	Room 108
Inspecting and Preserving Infrastructure through Robotic Exploration (INSPIRE)				
(Genda Chen, Yang Wang)				
SS-10		2.7A	13:00:00 - 15:15:00	Room 110
Intelligent Sensing Technology for Civil Infrastructures				
(He Zhang, Shunlong Li)				
SS-12		2.8A	13:00:00 - 15:15:00	Room 111
Structural Monitoring and Machine Learning in Wind Engineering: Wind and Wind Effects on Civil Structures				
(Teng Wu, Shanwu Li)				
BREAKOUT SESSION B		TRACK	TIME	LOCATION
RS-23		2.1B	15:30:00 - 18:00:00	Room 207
Monitoring-based Performance Assessment of Infrastructure				
(Enes Karaaslan, Furkan Luleci)				
RS-24		2.2B	15:30:00 - 18:00:00	Room 205
Monitoring-based Life Cycle Assessment of Infrastructures				
(Chinwendu Enyioha, Inad Alqurashi)				
RS-25		2.3B	15:30:00 - 18:00:00	Room 105
Monitoring-based Bridge Condition Assessment and Safety Warning				
(Wei LU, Mostafa Iraniparast)				
RS-32		2.4B	15:30:00 - 18:00:00	Room 106
Innovative Developments in Structural System Identification				
(Arthur Huang, Antonio Maria D'Altri)				
RS-09		2.5B	15:30:00 - 18:00:00	Room 107
Structural Monitoring and Control of High-speed Railway				
(Jian Li, Seyed Masoud Sajjadi Alehashem)				
RS-15		2.6B	15:30:00 - 18:00:00	Room 108
Computer Vision-based Structural Health Monitoring				
(Joe Kider, Mahta Zakaria)				
RS-22		2.7B	15:30:00 - 18:00:00	Room 110
Practical Estimation of Structural Displacement and Its Applications				
(Georgios Apostolakis, Sina Moosavi)				
SS-03		2.8B	15:30:00 - 18:00:00	Room 111
Advances in Computer Vision and Graphics for Structural Health Monitoring				
(Mohammad Jahanshahi, Hui Li)				
MINI SYMPOSIUM 2			TIME	LOCATION
MS-2			13:00:00 - 14:30:00	Room 101
Smart Cities and Smart Tourism				
(Panelists: Andrew Smyth, Therese McAllister, Mital Hall, Jeff Nenavides Moderator: Necati Catbas, Arthur Huang)				

JUNE 8 (WEDNESDAY)			
BREAKOUT SESSION A	TRACK	TIME	LOCATION
RS-12 Infrastructure Inspection Using Unmanned Aerial and Ground Vehicles (Jeffrey Kauffman, Chao Sun)	3.1A	09:00:00 - 11:15:00	Room 207
RS-01 New Development of Smart Devices for Structural Control (Lukasz Jankowski, Chih-shiuan Lin)	3.2A	09:00:00 - 11:15:00	Room 205
RS-20 Vehicle-Bridge Interaction and Its Applications in Bridge-Weigh-in-Motion (BWIM), Damage Detection, and Bridge Management (Robin Eunju Kim, Masoud Sanayei)	3.3A	09:00:00 - 11:15:00	Room 105
RS-28-2 Application of Structural Health Monitoring techniques (Patrick Sun)	3.4A	09:00:00 - 11:15:00	Room 106
SS-15 Artificial Intelligence Tools and Methods for Resilient Transportation (Mohamed Zaki, Zhibin Lin)	3.5A	09:00:00 - 11:15:00	Room 107
SS-04 Assessing Human-Infrastructure Interactions and Interfaces (Fernando Moreu, Hae Young Noh)	3.6A	09:00:00 - 11:15:00	Room 108
SS-14 Challenges in Distributed Coordination for Smart Structural Health Monitoring (SHM) (Chinwendu Enyioha, Shaurya Agarwal)	3.7A	09:00:00 - 11:15:00	Room 110

8WCSCM

Keynote Sessions



Keynote Session 1 (Monday, June 6 08:55 - 10:30, Room 101)

Session Chair: Andrew W. Smyth (Columbia University, U.S.A.)



KN 1-1

Human Activity Recognition: Learning with Less Labels and Privacy Preservation

Dr. Mubarak Shah

Center for Research in Computer Vision
University of Central Florida
U.S.A.

Date & Time: June 6 09:00 - 09:45

Abstract

Human activity recognition is one of the most active areas of research in Computer Vision. Due to deep learning tremendous progress has been made and several high-performance methods have been proposed. This extraordinary success of deep learning methods can be mostly attributed to advancements in supervised learning algorithms and the availability of large-scale labeled datasets. However, constructing large labeled datasets for supervised learning tends to be costly and is often infeasible.

In this talk, I will discuss our recent work on human activity recognition employing learning with less labels. In particular, I will present our work employing Semi-supervised learning (SSL), self-supervised learning and zero-shot learning. First, I will present our Uncertainty-aware Pseudo-label Selection (UPS) method for semi-supervised learning, where the goal is to leverage a large unlabeled dataset alongside a small, labeled dataset. Next, I will present self-supervised method, TCLR: Temporal Contrastive Learning for Video Representations, which does not require labeled data. Finally, I will present Pair-wise-Similarity Zero-shot Action Recognition (PS-ZAR) method, where the goal is to classify action classes which were not previously seen during training.

Advances in activity recognition have enabled a wide range of real-world applications, e.g. video surveillance camera, smart shopping systems like Amazon Go, elderly person monitor systems. Most of these video understanding applications involve extensive computation, for which a user needs to share the video data to the cloud computation server, where the user also ends up sharing the private visual information like gender, skin color, clothing, background objects etc. Therefore, there is a pressing need for solutions to privacy preserving action recognition. I will end this talk by briefly discuss our recently method SPAct: Self-supervised Privacy Preservation for Action Recognition.

Bio-sketch of Mubarak Shah

Dr. Mubarak Shah, the UCF Trustee Chair Professor, is the founding director of Center for Research in Computer Visions at University of Central Florida (UCF). Dr. Shah is a fellow of ACM, IEEE, NAI, IAPR, AAAS and SPIE; and a member of Academy of Science, Engineering and Medicine of Florida (ASEMFL). He has published extensively on topics related to visual surveillance, tracking, human activity and action recognition, object detection and categorization, shape from shading, geo registration, visual crowd analysis, etc. He has been ACM and IEEE Distinguished Visitor Program speaker and is often invited to present seminars, tutorials and invited talks all over the world. He is a recipient of ACM SIGMM Technical Achievement award; ACM SIGMM Test of Time Honorable Mention Award for his paper in Proceedings of the 14th ACM International Conference on Multimedia, MM 06; International Conference on Pattern Recognition (ICPR) 2020 Best Scientific Paper Award; IEEE Outstanding Engineering Educator Award; Harris Corporation Engineering Achievement Award; an honorable mention for the ICCV 2005 Where Am I? Challenge Problem; 2013 NGA Best Research Poster Presentation; 2nd place in Grand Challenge at the ACM Multimedia 2013 conference; and runner up for the best paper award in ACM Multimedia Conference in 2005 and 2010. At UCF he has received Pegasus Professor Award; University Distinguished Research Award; Faculty Excellence in Mentoring Doctoral Students; Scholarship of Teaching and Learning award; Teaching Incentive Program award;

Keynote Session 1 (Monday, June 6 08:55 - 10:30, Room 101)

Session Chair: Andrew W. Smyth (Columbia University, U.S.A.)



KN 1-2

Smart and Resilient Extraterrestrial Habitats

Dr. Shirley Dyke

Professor of Mechanical Engineering and Civil Engineering
Purdue University,
U.S.A.

Date & Time: June 6 09:45 - 10:30

Abstract

The creation of safe and comfortable habitations is one of humankind's oldest activities. Millennia of trials have brought the design and operation of habitats on Earth to a high degree of sophistication. However, as we consider moving out into Space, new challenges related to these harsh and unknown environments will impede safety and thus, progress. Designing to withstand the demands that such extreme environments will place on long-term deep space habitats represents one of the greatest challenges in this undertaking, and is the main the know-how to establish deep space habitat systems that are smart and resilient. We define SmartHabs as habitats that have the ability to sense, anticipate, respond to, and learn from disruptions. Resilience requires that we first develop an understanding of the system architecture and features that are needed to support resilience in a space habitat system. However, system architecture alone is not sufficient, so we are working on techniques to extract the necessary amount of actionable information for repair and recovery through monitoring and embedded intelligence. The mission of the Resilient ExtraTerrestrial Habitats Institute (RETHi) is to provide situational awareness and autonomy to enable the design of habitats that are able to adapt, absorb and rapidly recover from expected and unexpected disruptions. Both fully virtual and coupled physical-virtual simulation capabilities are being established to enable us to explore a wide range of potential deep space SmartHab configurations and operating modes.

Bio-sketch of Shirley Dyke

Professor Shirley Dyke holds a joint appointment in Mechanical Engineering and Civil Engineering at Purdue University. She is the Director of Purdue's Intelligent Infrastructure Systems Lab and the Director of the NASA funded Resilient ExtraTerrestrial Habitat Institute. Dyke is the Editor-in-Chief of the journal Engineering Structures. Her research focuses on "intelligent" structures, and her innovations encompass structural health monitoring and machine learning for structural damage assessment and reconnaissance support. She holds a B.S. in Aeronautical and Astronautical Engineering from the University of Illinois, Champaign-Urbana in 1991 and a Ph.D. in Civil Engineering from the University of Notre Dame in 1996. She was awarded the Presidential Early Career Award for Scientists and Engineers from NSF (1998), the International Association on Structural Safety and Reliability Junior Research Award (2001) and the ANCRiSST Young Investigator Award (2006).

Keynote Session 2 (Monday, June 6 10:40 - 12:15, Room 101)

Session Chair: Richard Christenson (University of Connecticut, U.S.A.)



KN 2-1

The physics-based path to learning, monitoring and virtualizing dynamical systems

Dr. Eleni Chatzi

Chair of Structural mechanics and Monitoring

Department of Civil, Environmental and Geomatic Engineering, ETH Zurich

Switzerland

Date & Time: June 6 10:45 - 11:30

Abstract

At the core of the engineering approach lies our ability to model on the basis of first principles. Drawing from physics principles it is possible to deliver approximations of engineering systems at diverse scales and resolutions, across time and space. In this talk, we discuss how to efficiently virtualize dynamical systems, by delivering digital approximations (twins) that compute fast and well approximate actual operating systems. Critical to this is the synergy of data, stemming from monitoring, with computationally affordable models that are powered from underlying principles of dynamics and mechanics. We demonstrate a hybrid approach, which can merge data with simulations, possibly in real-time. We demonstrate Reduced Order Modeling (ROM) schemes, which are coupled with estimators, such as Bayesian filtering, for virtual sensing of dynamical systems. We lastly augment the knowledge that our approximations of physics can afford via use of physics-informed deep learning strategies that integrate models and data for enhanced learning and predictive data-driven modeling.

Bio-sketch of Eleni Chatzi

Eleni Chatzi received her PhD (2010) from the Department of Civil Engineering and Engineering Mechanics at Columbia University, New York. She is currently an Associate Professor and Chair of Structural Mechanics and Monitoring at the Institute of Structural Engineering of the Department of Civil, Environmental and Geomatic Engineering of ETH Zürich. Her research interests include the fields of Structural Health Monitoring (SHM) and structural dynamics, nonlinear system identification, and intelligent life-cycle assessment for engineered systems. She is an author of over 280 papers in peer-reviewed journals and conference proceedings, and further serves as an editor for international journals in the domains of Dynamics and SHM, including the Journal of Sound and Vibration, Structure & Infrastructure Engineering, the Journal of Structural Engineering, Mechanical Systems and Signal Processing, the Journal of Engineering Mechanics, as well as the Sections on Structural Sensing and Computational Methods in Structural Engineering of Frontiers in Built Environment. She led the recently completed ERC Starting Grant WINDMIL on the topic of "Smart Monitoring, Inspection and Life-Cycle Assessment of Wind Turbines". Her work in the domain of self-aware infrastructure was recognized with the 2020 Walter L. Huber Research prize, awarded by the American Society of Civil Engineers (ASCE). She is further recipient of the 2020 EASD Junior Research Prize in the area of Computational Structural Dynamics.

Keynote Session 2 (Monday, June 6 10:40 - 12:15, Room 101)

Session Chair: Richard Christenson (University of Connecticut, U.S.A.)



KN 2-2

Physics-informed machine learning and transfer learning for structural health monitoring and vibration control

Dr. Yi-Qing Ni

Chair Professor of Smart Structures and Rail Transit, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University
China

Date & Time: June 6 11:30 - 12:15

Abstract

In the past decade, we have witnessed explosive developments and applications of machine learning (mainly deep neural networks) in various science and engineering fields, including its applications in structural health monitoring and vibration control. Deep neural network models can be trained with powerful nonlinear function approximation capability with aid of rich data which are usually experimental (monitoring) or simulation results. However, when applying data-hungry deep neural networks to structural health monitoring and vibration control problems, obtaining labeled training data with regard to various damage scenarios or excitation conditions is often impractical or prohibitively expensive. The recent years have seen a revolution in deep learning with the advent of physics-informed neural networks (PINNs) for the forward and inverse problems of physical systems characterized by ordinary or partial differential equations (ODEs/PDEs), using small amounts of data or even no data. The PINNs encode the physical laws (in terms of ODEs/PDEs and their boundary/initial conditions) and prior physical knowledge into deep neural networks, so that the underlying physics can be embedded while alleviating the need for supervised learning using large amounts of labeled data. Moreover, PINNs provide a desirable platform for synergy with transfer learning to leverage the knowledge from physics and from observations and the information from multi-fidelity data. This presentation will elucidate the applications of PINNs in conjunction with transfer learning in the field of structural health monitoring and vibration control, and discuss some current bottlenecks and future research directions.

Bio-sketch of Yi-Qing Ni

Dr. Yi-Qing Ni is Yim, Mak, Kwok & Chung Professor in Smart Structures, Chair Professor of Smart Structures and Rail Transit at Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong. He is the Director of the National Engineering Research Center on Rail Transit Electrification and Automation (Hong Kong Branch). He has published more than 250 SCI journal papers indexed in Web of Science Core Collection and over 330 conference papers. His publications receive an H-index of 45 and more than 7,000 citations in Web of Science Core Collection, and receive an H-index of 59 and over 13,000 citations in Google Scholar. He is a Co-Editor-in-Chief for Journal of Infrastructure Intelligence and Resilience (Publisher: Elsevier) and Intelligent Transportation Infrastructure (Publisher: Oxford University Press), and serves as an associate editor or editorial board member for ten journals, including Engineering Structures, Structural Control and Health Monitoring, Smart Structures and Systems, Journal of Civil Structural Health Monitoring, Journal of Vibration and Control, Structural Monitoring and Maintenance.

Keynote Session 3 (Tuesday, June 7 08:55 - 10:30, Room 101)

Session Chair: Genda Chen (Missouri S&T, U.S.A.)



KN 3-1

Active Thermography for Inspection, Monitoring and Control: From Technology Development to Commercialization

Dr. Hoon Sohn

Professor of Civil and Environmental Engineering
Korea Advanced Institute of Science and Technology (KAIST)
Republic of Korea

Date & Time: June 7 09:00 - 09:45

Abstract:

In this presentation, an active thermography system is developed for automated, noncontact, and nondestructive inspection, monitoring and control of various engineering structures. The developed system uses a laser beam or halogen lamp to heat up the target structure, and the corresponding electromagnetic radiation is measured using an infrared camera. Several real-world applications of the developed active thermography system is showcased in the presentation. First, the coating thickness and surface defects, such as corrosion, delamination, checking and chalking, of painted steel structures are visualized, classified and quantified using the active thermography system and machine learning. The active thermography system is also integrated with a drone or unmanned vehicle for automated inspection of bridges, pipelines, and ships. Other applications include online monitoring and process control during metal 3D printing and in-line inspection of electronic car batteries.

Bio-sketch of Hoon Sohn

Hoon Sohn is Professor at KAIST (Korea Advanced Institute of Science and Technology), and the Director of 3D Printing Nondestructive Testing Center sponsored by the National Research Foundation of Korea. Over last twenty-five years, his research interest has been in the areas of structural health monitoring, nondestructive testing, sensing technologies and data analytics. He has published over 200 refereed journal articles, over 390 conference proceedings, and 11 book & book chapters. He is holding 44 domestic and 16 international patents, and his developed technologies are licensed and commercialized by private companies. He is currently SPIE Fellow, Member of National Academy of Engineering of Korea (NAEK), and Member of Korean Academy of Science and Technology (KAST).

Keynote Session 3 (Tuesday, June 7 08:55 - 10:30, Room 101)

Session Chair: Genda Chen (Missouri S&T, U.S.A.)



KN 3-2

The physical model of leak noise and leak detection of urban gas pipelines

Dr. Jie Li

Chair Professor of Tongji University, Academician of the Chinese Academy of Science
Civil Engineering School, Tongji University
China

Date & Time: June 7 09:45 - 10:30

Abstract

Gas supply system is an essential component of modern urban infrastructural systems. Due to factors such as corrosion, mechanical or material failure, leakage of gas pipelines may lead to significant economic and energy losses. This lecture introduces a new acoustic-based method developed for leak detection as well as the leakage location for gas pipelines. The method is established on the physical model of leak noise. The model takes into account the effects of pipe pressure, pipe diameter, leak size as well as material parameters of the pipe and the gas. An machine learning method is proposed based on the physical model and statistical features of leak noise, and is applied to the leak detection of gas pipelines. Meanwhile, a physical leakage location model is developed which can be used for finding the leakage position and to determine the maximum distance of deployment location of sensors. On these basis, a model-based location technique is suggested and some application example is introduced. The new technology may offer a kind of real-time monitoring system for the maintenance of urban gas supply networks.

Bio-sketch of Jie Li

Prof. Jie Li received Ph.D. in Structural Engineering from Tongji University, China in 1988, and received an honorary doctorate in engineering science from Aalborg University, Denmark in 2013. He has been devoted to the research on structural engineering and stochastic mechanics over 35 years. His contributions are distributed in the area of stochastic dynamics, damage mechanics, engineering reliability and lifeline systems. Prof. Li is the author of six monographs and more than 400 peer reviewed journal papers. In 2014, Prof. Li was awarded the Alfred M. Freudenthal Medal by ASCE, owing to his academic achievements in the probability density evolution method and in the seismic reliability based design of large-scale infrastructure systems. Prof. Li currently serves as the president of International Association for Structural Safety and Reliability (IASSAR), a member of the director board of International Conference of Damage Mechanics (ICDM), and the Fellow of Engineering Mechanics Institute (EMI).



KN 4-1

Digital Twins: The Next Phase of the AI Revolution?

Dr. Mark Girolami

Sir Kirby Laing Professor of Civil Engineering

Royal Academy of Engineering Research Chair in Data Centric Engineering, University of Cambridge

United Kingdom

Date & Time: June 7 10:45 - 11:30

Abstract

The idea of an Intelligent Digital Avatar conjures up many images from a complete virtual world that one can safely define, develop and play in to rogue robots running amok and destroying mankind. The reality is much less dramatic but no less far reaching and exciting. This talk will discuss Digital Twins and chart their history to present day technological capability and present some of the advances being made and the opportunities along with the open challenges faced to realise the potential of Digital Twins.

Bio-sketch of Mark Girolami

Mark Girolami is the Chief Scientist of The Alan Turing Institute and took up this role from October 2021. Previous to his role as Chief Scientist he led The Alan Turing Institute-Lloyds Register Foundation programme in data-centric engineering which launched a whole new discipline that has global reach and influence.

Under his leadership, the data-centric engineering programme (DCE) grew from an initial grant to a multi-million pound global research and innovation enterprise that saw the delivery of a number of 'world-firsts' including the world's first self-sensing 3D printed stainless steel pedestrian bridge in Amsterdam; sustainable and more efficient underground agriculture; advanced AI enabled city scale air quality monitoring systems; the city level monitoring of social distancing and activity assessment in guiding London through the COVID-19 pandemic; the development of an AI enabled UK Air Traffic Control Service, and digital twin technologies in rail transportation and aerospace design, amongst many others.

The launch of the international Data-Centric Engineering journal by Cambridge University Press firmly established DCE as a new emerging discipline of global importance. Mark was also the driving force behind the first-ever DCEng Summit in September 2021. The event attracted international expert speakers from countries around the globe and represented a landmark moment in the growth of the discipline. In 2019 Mark Girolami was elected to the Sir Kirby Laing Professorship of Civil Engineering within the Department of Engineering at the University of Cambridge where he also holds the Royal Academy of Engineering Research Chair in Data Centric Engineering. He took up the Sir Kirby Laing Chair upon the retirement of Professor Lord Robert Mair. Prior to joining the University of Cambridge Professor Girolami held the Chair of Statistics in the Department of Mathematics at Imperial College London.

He was an EPSRC Established Career Research Fellow (2012-2018), an EPSRC Advanced Research Fellow (2007-2012), was a recipient of a Royal Society Wolfson Research Merit Award, and in 2011 was elected to the Fellowship of the Royal Society of Edinburgh.



KN 4-2

Development of scum geometrical monitoring beneath floating covers aided by UAV photogrammetry

Dr. Wing Kong Chiu

Professor of Mechanical and Aerospace Engineering
Monash University
Australia

Date & Time: June 7 11:30 - 12:15

Abstract

Floating covers are used on anaerobic lagoons at waste-water treatment plants for odour control and the harvesting of biogas. Scum is an unwanted by-product of the anaerobic digestion of raw sewage. This matter can form into a large mass of material, and when it floats to the surface and solidifies, it is called a scumberg to differentiate it from the scum which may still be in a semi-solid state. Given the continual inflow of raw sewage into the lagoon, the potential movement of the scum can deform the floating cover. One of the challenges pertaining to the structural health assessment of the floating cover hinges upon the difficulty in monitoring the development and geometrical profile of scum underneath the cover. The current measurement of scum requires the inspector to physically access the scum either from multiple discrete access ports within the floating cover or by using highly-skilled divers in the lagoon. In collaboration with Melbourne Water Corporation, a non-contact UAV-aided photogrammetry technique has been deployed to quantify the development of scum underneath the cover. It is shown that the digital elevation model obtained from photogrammetry correlates well with direct laser-based measurements of elevation, and that cluster analysis can be used in conjunction with the digital elevation model to estimate the qualitative hardness level of the scum beneath the cover, thereby providing a viable alternative to time-consuming walk the cover type inspections. It is also shown that the total scum depth as predicted from the digital elevation model correlates well with the measurements taken through the access ports. This method could be a safe and cost-effective alternative to current practice.

Bio-sketch of Wing Kong Chiu

Professor Chiu is a member of academic staff at the Department of Mechanical & Aerospace Engineering at Monash University, Australia. He is an internationally recognised researcher in structural health monitoring and his work spans across aerospace (aircraft structures), civil (pipelines and large membrane floating covers), rail (integrity assessment of tracks) and mechanical (rotating equipment) engineering. Chiu has extended his knowledge in structural health monitoring to the medical area and has developed strong collaboration with researchers and surgeons from The National Trauma Research Institute. He is currently collaborating with Professor Fitzgerald on numerous projects. Apart from securing research funding, they have jointly filed two patents. He is co-chairing the 9th Asia-Pacific Workshop on Structural Health Monitoring in Cairns, Australia in 2022. This workshop is now widely recognised as the 3rd leg in the global workshop on structural health monitoring. With the International Workshop on Structural Health Monitoring and the European Workshop on Structural Health Monitoring being the 1st and the 2nd leg respectively. Chiu is a member of the International Organising Committee of the International Workshop on Structural Health Monitoring (held biennially at Stanford University).

8WCSCM Breakout Sessions



JUNE 6 (MONDAY)**SS-13-1****1.1A****Room 207****Vibration-based Structural Health Monitoring and damage identification (Part I)**

(Maria Pina Limongelli, Kenneth J. Loh)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	12	Damage detection of structures under the effects of outlier measurements and changing environmental conditions	William Soo Lon Wah
13:19:00 - 13:38:00	21	Robust and fast identification of crack parameters in a vibrating beam using modifications in the Unscented Kalman Filter	Adrita Kundu, Rahul Gauriyar, Suparno Mukhopadhyay
13:38:00 - 13:57:00	22	Modal identification of bridges using a single moving sensor	Dhiraj Ghosh, Shaily Jain, Suparno Mukhopadhyay
13:57:00 - 14:16:00	23	Detection of Crack in Plates Using Flexural Vibration Response Data	Punit Kumar, Sourabh Gayaprasad Jaiswal, Suparno Mukhopadhyay
14:16:00 - 14:35:00	61	Structural Identification and Monitoring of a 52-Story High-Building in Downtown Los Angeles Based on Short-Term Ambient Vibration Measurements	Mohamed Abdelbarr, Monica Kohler, Sami Masri
14:35:00 - 14:54:00	74	Using a New Generalized Autoencoder with Cepstral Coefficients for Structural Damage Assessment	Lechen Li, Marcello Morgantini, Raimondo Betti
14:54:00 - 15:13:00	106	Nonlinear normal modes for damage detection: theoretical concepts and preliminary experimental validation.	Biagio Carboni, Sawan Kumar Guruva, Stefano Catarci, Giuseppe Quaranta, Walter Lacarbonara

SS-01-1**1.2A****Room 205****Harnessing Nonlinearities in Passive Control Systems (Part I)**

(Nicholas E. Wierschem, Zheng Lu)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	17	Experimental Study and Constitutive Model for Viscoelastic Dampers with Different Mechanical Performances	Xiaofang Liu, Zhan Shu, Ying Zhou
13:19:00 - 13:38:00	18	An innovative mass damper enabled by three different types of masses and internal vibro impacts	Jingjing Wang, Yuqiang Zheng
13:38:00 - 13:57:00	19	Design and Experimental Verification of Geometrically Nonlinear Viscous Damper in Seismic Isolation for Protection of Essential Equipment in Buildings	Chia-Ming Chang, Chieh-Yu Liu
13:57:00 - 14:16:00	72	Optimization of the Variable Inertia Rotational Mechanism using Machine Learning	Anika Sarkar, Nicholas Wierschem
14:16:00 - 14:35:00	76	Dynamic Analysis of Rocking Wall-Frame Structures Considering SSI Effect	Dongyi He, Peizhen Li
14:35:00 - 14:54:00	210	Structural control performance of impact dampers attached to a nonlinear benchmark structure under various excitations	Zheng Lu, Mengyao Zhou
14:54:00 - 15:13:00	220	Shaking table tests on reinforced concrete frame with metallic dampers	Qingxue Shang, Xipeng Zhang, Jichao Li, Tao Wang

SS-06-1**1.3A****Room 105****New Advances in Enhanced Passive, Adaptive Passive, & Semi-active Vibration Control (Part I)**

(Chao Sun, Yan Zhang)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	6	Mathematical Modeling and Experimental Validation of a Semi-Active Omnidirectional Tuned Liquid Column Damper	Behnam Mehrkian, Markus Zimmer, Okay Altay
13:19:00 - 13:38:00	16	Evaluation of Semi-active Control for Base Isolation System with Nonlinearity by Dual Real-time Hybrid Simulation	Aoi Honma, Hideo Fujitani, Yoichi Mukai

JUNE 6 (MONDAY)			
13:38:00 - 13:57:00	34	Semi-active damping of structural vibrations using controllable truss-frame nodes	Lukasz Jankowski, Błażej Popławski, Mariusz Ostrowski, Aleksandra Jedlińska, Grzegorz Mikułowski, Bartłomiej Błachowski, Dominik Pisarski, Rafal Rwisz@Ippt.Pan.Pl, Amroz@Adaptronica.Pl Jan
13:57:00 - 14:16:00	85	Vibration reduction of wind turbine blade using a two-dimensional tuned mass damper inerter	Vahid Jahangiri, Chao Sun
14:16:00 - 14:35:00	90	Influence of the layout of a particle damper on its effectiveness	Angeliki Papalou
14:35:00 - 14:54:00	91	Transmissibility-based semi-active controller for enhancing the seismic performance of base-isolation systems	Yunbyeong Chae, Ramin Rabiee
14:54:00 - 15:13:00	108	Resilient optimal viscous damper design for elastic-plastic moment frames using normalized critical double impulse	Hiroki Akehashi, Izuru Takewaki

SS-07-1

1.4A

Room 106

Computer vision and machine learning-based infrastructure monitoring and inspection (Part I)

(Wei Song, Bill Spencer)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	43	A Novel Unsupervised Deep Learning Method Using A Convolutional Auto-encoder to Detect Structural Damage	Zilong Wang
13:19:00 - 13:38:00	122	Investigation of Robustness in DCNNs for Crack Segmentation	Carlos Canchila, Shanglian Zhou, Wei Song
13:38:00 - 13:57:00	83	Unsupervised Discrepancy-based Domain Adaptation for Multiple Damage Detection of Maglev Rail Joints	Gaofeng Jiang, Su-Mei Wang, Yi-Qing Ni
13:57:00 - 14:16:00	84	Drive-by Damage Detection in Bridges using Mel-frequency Cepstral Coefficients and Machine Learning	Zhenkun Li, Weiwei Lin, Youqi Zhang
14:16:00 - 14:35:00	88	Dual Attention Convolutional Neural Network (DACNN) for Road Condition Assessment Using 3D Laser Imaging Device	Elham Eslami, Hae-Bum Yun
14:35:00 - 14:54:00	118	An Efficient Foreign Object Intrusion Detection Method for Ballast Tracks Based on Deep Segmentation Convolutional Neural Network	Wenqiang Liu, Yi-Qing Ni
14:54:00 - 15:13:00	121	Computer Vision and Augmented Reality for Human-centered Fatigue Crack Inspection of Steel Bridges	Ruhsil Mojidra, Ali Mohammadkhorasani, Jian Li, Fernando Moreu, William Collins, Caroline Bennett

RS-02

1.5A

Room 107

Structural Control of Bridges under Earthquake or Multiple Hazards

(Mayuko Nishio, Baki OZTURK)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	24	Real-Time Hybrid Simulation to Demonstrate Seismic Behavior of Response-Controlled Multi-Stories RC Frame Structure	Yoichi Mukai, Shun-Nosuke Fujii, Baku Tanaka, Takashi Fujinaga, Hideo Fujitani
13:19:00 - 13:38:00	71	An Experimental Study for the Damping of Earthquake Effects in Buildings by Magnetic Forces	Baki Ozturk, Ersin Aydin, Huseyin Cetin, Sahin Kaya, Erdil Ozdengel
13:38:00 - 13:57:00	139	Exploring the impact of excitation and structural response/performance modeling fidelity in the design of seismic protective devices	Dimitrios Patsialis, Alexandros Taflanidis, Agathoklis Giaralis
13:57:00 - 14:16:00	173	System Fragility Analysis of a Geometrically Complex Bridge for Seismic Risk Evaluation of Existing Highway Bridge Network	Muhammad Rashid, Mayuko Nishio

JUNE 6 (MONDAY)			
14:16:00 - 14:35:00	201	RESPONSE COMPARISON OF BASE-ISOLATED BUILDINGS UNDER NANKAI TROUGH EARTHQUAKES AND SHOWA-NANKAI EARTHQUAKES	Takeshi Ikeda, Atsuko Shirayama, Tadamichi Yamashita, Hiroki Ogawa, Junko Kanai
14:35:00 - 14:54:00	251	Development of Multi-Step Deformation Absorption Concept to enhance the Seismic Performance of Bridge Structures.	Kondo Shinya, Unjoh Shigeki
14:54:00 - 15:13:00	258	Control of excessive bridge responses under unanticipated earthquakes through an innovative rocking isolation bearing system (RIBS)	Xinhao He, Unjoh Shigeki

RS-03

1.6A

Room 108

Seismic Isolation in Civil Engineering

(Gaston Fermandois, Yaohua Yang)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	62	Active control of an electromechanical inerter mass damper	Daniel Maurel, Gaston Fermandois
13:19:00 - 13:38:00	69	Linear Quadratic Regulator Design for a Seismic Control System to Minimize Recovery Time of Medical Facility	Masayuki Kohiyama
13:38:00 - 13:57:00	263	Evaluation of Seismic Response Characteristics of Bridges with Rocking Isolation Bearing System (RIBS)	Yoshihiro Tajiri, Xinhao He, Unjoh Shigeki
13:57:00 - 14:16:00	130	Innovative Prefabricated FPB-CFST system for Seismic Isolation	Jingcai Zhang, Xinchun Guan, Yong Ding
14:16:00 - 14:35:00	149	Feasibility investigation of a negative stiffness-based base-isolation seismic design for bridges	Xu Chen, Zhongguo Guan, Jianzhong Li, Xiaowei Wang
14:35:00 - 14:54:00	167	RESPONSE EVALUATION OF BASE-ISOLATED BUILDINGS CONSIDERING MULTI-CYCLIC CHARACTERISTICS UNDER LONG-PERIOD GROUND MOTION	Atsuko Shirayama, Tadamichi Yamashita

RS-04

1.7A

Room 110

Application and testing of new materials and techniques in semi-active vibration control

(Patrick Sun, Sina Shid-Moosavi)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	46	Real-time Neural Network Based Semiactive Model Predictive Control of Structural Vibration	Tianhao Yu, Erik Johnson
13:19:00 - 13:38:00	101	Use of a novel rate-independent damper for performance improvement of a seismically isolated building structure	Hao Luo, Zi-An Tang, Hong-Ping Zhu
13:38:00 - 13:57:00	141	Structural Seismic Response Suppression Using Magnetorheological (MR)-based Smart Devices	Yang Yu, Bijan Samali, Maria Rashidi, Masoud Mohammadi, Huan Li, Yancheng Li, Jianchun Li
13:57:00 - 14:16:00	256	Active and Semi-active Control of In-plane Parametric Vibration of Super-long Stay Cable Subjected to Axial Excitation	Junping Du, Min Liu
14:16:00 - 14:35:00	268	SECONDARY DEVELOPMENT AND APPLICATION OF BIO-INSPIRED ISOLATION SYSTEM	Quanwu Zhang, Zhiguo Shi, Weixing Shi, Jiazeng Shan
14:35:00 - 14:54:00	269	Numerical analysis and verification of energy harvesting circuit for Regenerative Hybrid Electromagnetic Damper	Youjin Kim, Seungkyung Kye, Hyung-Jo Jung
14:54:00 - 15:13:00	293	Metamaterials for vibration mitigation: from linearity to vibro-impact	Kyriakos-Alexandros Chondrogiannis, Vasilis Dertimanis, Oleg Gendelman, Sami Masri, Eleni Chatzi

JUNE 6 (MONDAY)

RS-06

1.8A

Room 111

Wind Effects and Wind-Induced Vibration Control for Large-Scale Structures

(Agathoklis Giaralis, Sunjoong Kim)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	123	Wind-Induced Fatigue Damage in a Tall Building with a Semi-active Control System	Mohammad Nafisifard, Saeed Behboodi, Maryam Bitaraf
13:19:00 - 13:38:00	147	Low-frequency cable-vibration monitoring and cause investigation in a cable-stayed bridge	Ho-Kyung Kim, Sejin Kim, Jae-Yeong Lim, Sunjoong Kim, Hyungchul Yoon, Sangsup Ahn
13:38:00 - 13:57:00	192	Self-weight reduction of lateral load-resisting system in wind-sensitive tall buildings using ground-floor tuned inerter damper	Zixiao Wang, Agathoklis Giaralis
13:57:00 - 14:16:00	231	Development of piezo-resistive cement-based composites with few layer graphene oxide as conductive filler	Yasmim Gabriela Dos Santos Mendonça, Jéssica Menezes De Mélo Luzardo, Joyce Rodrigues De Araujo, Oscar Mendoza Reales, Romildo Dias Toledo Filho
14:16:00 - 14:35:00	239	An approach for parametric identification of vortex-excited force using on-site measured vibration data on a long-span bridge	Liu Peng, Cui Wei, Lin Zhao, Yaojun Ge
14:35:00 - 14:54:00	265	Field measurement of stay cable-deck vibrations of a cable-stayed bridge in wind and wet-snow environment	Zhiwen Liu, Ruilin Zhang, Chao Yang, Xianmin Zhao, Zhenyu Gao, Zhengqing Chen
14:54:00 - 15:13:00	290	Dynamic Modal Identification of a Long-Span Bridge Under Extreme Wind Load	Selcuk Bas, Nurdan Memisoglu Apaydin, Necati Catbas

SS-13-2

1.1B

Room 207

Vibration-based Structural Health Monitoring and damage identification (Part II)

(Mustafa Gül, Mohamed Zaki)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	111	Re-weighted adversarial domain adaptation for vibration-based structural damage identification	Xiaoyou Wang, Yong Xia
15:49:00 - 16:08:00	194	Application of a vibration-based transfer learning strategy for SHM enriched by the use of speaker recognition x-vectors	Eleonora Maria Tronci, Homayoon Beigi, Raimondo Betti, Maria Q. Feng
16:08:00 - 16:27:00	198	CycleGAN for Dynamic Response Domain Translation in SHM	Furkan Luleci, Necati Catbas
16:27:00 - 16:46:00	216	Vibration-based monitoring of external post-tensioning tendons: tension force estimation	Javier Naranjo-Pérez, Iván M Díaz, Carlos M.C. Renedo, Jaime H. García-Palacios
16:46:00 - 17:05:00	225	Capacity Curve Derivation from Recorded Floor Accelerations for Seismic Building Damage Evaluation: Advancements and Avenues for Future Research	Trevor Yeow, Koichi Kusunoki, Haoran Pan
17:05:00 - 17:24:00	274	Investigation of Span Dependency of a Multi-Span Highway Bridge	Abdulrahman Algadi, Matthieu Perrault, Furkan Luleci, Marwan Debees, Laurent Guerneau, Necati Catbas
17:24:00 - 17:43:00	283	Structural Health Monitoring of World's Longest Suspension Bridge: 1915 Çanakkale Bridge	Necati Catbas, Anıl Gündemir, Fatih Öztürk, Ferruh Aytekin

SS-01-2

1.2B

Room 205

Harnessing Nonlinearities in Passive Control Systems (Part II)

(Jingjing Wang, Shujin Laima)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	229	Full-scale Experimental Study on the Performance of a Viscoelastic Damper with Improved Out-of-plane Stiffness	Zhao Xuelian, Ying Zhou
15:49:00 - 16:08:00	230	A comprehensive study of the aerodynamic behavior of the Brasilia Telecom Tower	Redescar Virel, Ronaldo Battista, Michèle Pfeil
16:08:00 - 16:27:00	245	Experimental Investigation of Multi-Story Structure Incorporating the Sliding Bistable Nonlinear Energy Sink	Weite Su, Zhichao Qian, Solomon Tesfamariam, Yangyang Chen
16:27:00 - 16:46:00	272	Vibration Control Performance of Pendulum TMD with Additional Stopper for String	Chao Xia, Liang Xu

JUNE 6 (MONDAY)			
16:46:00 - 17:05:00	277	Passive Control of an Electromagnetic Friction Damper for Displacement Reduction of Multi-Story Base-Isolated Buildings	Mohsen Amjadian, Anil Kumar Agrawal, Liang Cao, Syed Muhammad Bilal Haider
17:05:00 - 17:24:00	287	Performance evaluation of three-element passive vibration control for stay cables	Wang Zhi-Hao, Cheng Zhi-Peng, Xu Yan-Wei, Yue Fang-Fang, Gao Hui
17:24:00 - 17:43:00	288	Testing, modeling, and performance evaluation of an axial eddy-current damper with nonlinear damping characteristics for structural vibration control	Cheng Zhi-Peng, Wang Zhi-Hao, Xu Yan-Wei, Cui Kai-Qiang

SS-06-2

1.3B

Room 105

New Advances in Enhanced Passive, Adaptive Passive, & Semi-active Vibration Control (Part II)

(Haifeng Wang, Amrit Verma)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	129	Recent developments on robust adaptive compensation in multi-axial real-time hybrid simulation	Gaston Fernandois, Cristobal Galmez
15:49:00 - 16:08:00	164	Aseismic protection of a nonlinear base-isolated structure using a semi-active tuned mass damper	Liangkun Wang, Satish Nagarajaiah, Ying Zhou
16:08:00 - 16:27:00	189	Schwarzite metamaterial for damping enhancement	Sudheendra Herkal, Muhammad Rahman, Satish Nagarajaiah, Vijay Vedhan Harishnan, Pulickel Ajayan
16:27:00 - 16:46:00	218	Evolutionary Aseismic Design and Control of 3D Structures using Passive Devices	Tiancheng Wang, Georgios Apostolakis
16:46:00 - 17:05:00	219	Aseismic Design and Control of Steel Frames using Self-Centering Systems and Passive Dampers	Hector Blanco, Georgios Apostolakis
17:05:00 - 17:24:00	233	Numerical analysis on the collapse behavior of composite sub-frames with different span-to-depth ratios	Tan Zheng
17:24:00 - 17:43:00	237	Proposal of A Novel Connecting Control Method Utilizing a Tuned Mass Damper as Coupling Mechanism Applicable to Two Identical Structures	Ryota Nakazato, Toru Watanabe

SS-07-2

1.4B

Room 106

Computer Vision and Machine Learning-based Infrastructure Monitoring and Inspection (Part II)

(Dr. Jian Li, Yuequan BAO)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	67	3D Damage Quantification for Visual Inspection	Rishabh Bajaj, Zaid Al-Sabbag, Chul Min Yeum, Sriram Narasimhan
15:49:00 - 16:08:00	137	A Comparative Study on Deep Learning-based Pavement Crack Segmentation	Shanglian Zhou, Carlos Canchila, Wei Song
16:08:00 - 16:27:00	144	Development of synthetic environments for autonomous bridge visual inspection	Yasutaka Narazaki, Mingyu Shi
16:27:00 - 16:46:00	169	Prediction of Damage State of RC Buildings Using Machine Learning	Sanjeev Bhatta, Ji Dang
16:46:00 - 17:05:00	186	Deep generative models for unsupervised delamination detection using guided waves	Mahindra Rautela, Shirley Dyke, S. Gopalakrishnan
17:05:00 - 17:24:00	292	Machine Learning for Strength Estimation of in Service Damaged Concrete by AE Data	Sena Tayfur, Yuma Shimamoto, Tetsuya Suzuki, Ninel Alver

RS-11

1.5B

Room 107

Recent Advances in Sensing Technology for Structural Health Monitoring

(Jie Xu, Inad Alqurashi)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	113	3D Electrical Resistance Tomography for Localizing Damage in Solid Skin Covered Lattice Structures	Yening Shu, Saptarshi Mukherjee, Tammy Chang, Abigail Gilmore, Joseph Tringe, David Stobbe, Kenneth Loh
15:49:00 - 16:08:00	136	Recent Development on Corrosion Sensor Based on Electromechanical Impedance Instrumented Piezoelectric-Metal Transducer	Wei jie Li, Zhishun Liu, Xuefeng Zhao

JUNE 6 (MONDAY)			
16:08:00 - 16:27:00	156	Detection of Submarine Pipeline Exposure on Offshore Drilling Oil Platforms Based on Real-Time 3D Sonar	Jie Xu, Xuan Liu, Qian Ma, Sida Lian
16:27:00 - 16:46:00	172	Scattering analysis of nonlinear Lamb wave due to debonding in metallic stiffened panel	Abhijeet Kumar
16:46:00 - 17:05:00	181	Research on Dynamic Inclination Monitoring Method Based on Acceleration Measurement and Kalman Filtering	Yiming Zhao, Danhui Dan
17:05:00 - 17:24:00	188	Remote monitoring of bridge displacements with satellite SAR technology	Daniel Tonelli, Valeria F. Caspani, Daniele Zonta
17:24:00 - 17:43:00	232	Additional Aseismic Damping Solution to Protect Tension-only Braced Structures from Degrading with Seismic Strikes	Zi Gu, Wensheng Lu

RS-05

1.6B

Room 108

Flow Controls for Wind and Structural Engineering

(Francesc Pozo, Dryver Huston)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	7	Using Toroidal Tuned Liquid Column Dampers to Mitigate Monopile Wind Turbine Vibrations Bidirectionally	Hao Ding, Okay Altay, Jinting Wang
15:49:00 - 16:08:00	94	Rapid Modeling and Analysis of Composite Wind turbine blades	Haotian Du
16:08:00 - 16:27:00	132	The shear resonance mechanism for VLSMs	Hehe Ren
16:27:00 - 16:46:00	96	Integration of BrIM and BMS to support bridge life-cycle management	Carlos Santos, Mário Coelho, Jose Matos, Necati Catbas
16:46:00 - 17:05:00	202	Parametric Uniform Manifold Approximation and Projection to Improve the Structural Damage Classification in a Wind Turbine Foundation	Jersson Xavier Leon Medina, Núria Parés, Maribel Anaya, Diego Tibaduiza, Francesc Pozo
17:05:00 - 17:24:00	203	Enhancing structural performances of offshore wind turbines using track nonlinear energy sinks	Haoran Zuo, Songye Zhu

RS-14

1.7B

Room 110

Computer Vision-based Sensing and System Identification

(Ho-Kyung Kim, Wei Song)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	73	Novel trends on the assessment and management of maritime infrastructures: Outcomes from GIIP project	Jose Matos
15:49:00 - 16:08:00	104	Vibration-based Structural Damage Identification using Deep Convolutional Neural Networks-A Review	Sayed Jamalaldin Seyed Hakim, Mohd Irwan Juki, David Yeoh, Shahrul Niza Mokhatar
16:08:00 - 16:27:00	119	Development of Mobile Testing and Computer Vision-based Technologies for Rapid Dynamic Identification of Bridges	Yongding Tian
16:27:00 - 16:46:00	148	A new inspection technique for deformation and crack analysis in shield tunnels	Yifei Liu, Asif Ahmed, Wei Song, Yihai Bao, Xian Liu
16:46:00 - 17:05:00	152	Pedestrian Suspension Bridge Monitoring using Computer Vision	Hyungchul Yoon, Jeonghyeok Lim, Sunjoong Kim, Wonsuk Park, Eui-Seung Hwang, Ho-Kyung Kim
17:05:00 - 17:24:00	171	Bayesian inference for seismic damage assessment in a reinforced concrete structure	Cheng Xiu, Pier Francesco Giordano, Jiazeng Shan, Maria Pina Limongelli
17:24:00 - 17:43:00	208	Robust Output-only Modal Identification with Full-field, High-spatial-dimensional Video Measurements	Yongchao Yang, Charles Dorn

JUNE 6 (MONDAY)**RS-17****1.8B****Room 111****Bayesian Inference and Uncertainty Quantification in SHM: New Algorithms and Applications**

(Arash Noshadravan, Qiu Yu)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	47	Model falsification from a Bayesian viewpoint with applications to system identification and model selection	Agnimitra Dasgupta, Erik Johnson
15:49:00 - 16:08:00	109	Data fusion based settlements prediction of adjacent structures impacted by tunneling in soft soils	Xin Xie, Hengdong Wang, Jian Wang, Jian Huang, Zhongkai Huang
16:08:00 - 16:27:00	145	A Bayesian Framework for Human-AI Partnership in Disaster Damage Classification	Chih-Shen Cheng, Amir Behzadan, Arash Noshadravan
16:27:00 - 16:46:00	153	Bayesian approaches for estimation of suspension bridge deflection variation under thermal affection	Qf Zhou, Yw Wang, Yi-Qing Ni
16:46:00 - 17:05:00	255	Diagnosis of Guided-wave damage localization using Complex Hierarchical Sparse Bayesian learning	Shicheng Xue, Yong Huang, Wensong Zhou, Hui Li
17:05:00 - 17:24:00	257	An Efficient Strain/Temperature Identification Method of BOTDA System Based on Bayesian Inference	Xianghao Meng, Yong Huang, Dongyu Zhang, Hui Li
17:24:00 - 17:43:00	260	Comparison of Advanced Sampling Methods for Bayesian System Identification	Ertuğrul Türker Uzun, Çağlayan Hızal, Engin Aktaş

JUNE 7 (TUESDAY)**RS-16****2.1A****Room 207****Structural Health Monitoring with Multi-Data**

(Wen Shen, Chul Min Yeum)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	103	Full domain flow information recognition around buildings with sparse near-wall data through a physics-informed data-driven approach	En-Ze Rui, Zheng-Wei Chen, Yi-Qing Ni, Lei Yuan
13:19:00 - 13:38:00	115	Research and application of intelligent monitoring of building curtain wall	Zhang Yingying, Lu Shaomin
13:38:00 - 13:57:00	165	Unsupervised deep learning approach to damage detection and localization using Lamb waves	Luca Lomazzi, Rafael Junges, Marco Giglio, Francesco Cadini
13:57:00 - 14:16:00	200	Global displacement reconstruction of a lattice tower using limited acceleration and strain data based on a novel data fusion method	Qing Zhang
14:16:00 - 14:35:00	234	Target-free binocular vision-based method for 3D vibration displacement measurement	Jun Li
14:35:00 - 14:54:00	296	Multi-channel missing data recovery for structural health monitoring	Siyi Chen, Yw Wang, Yi-Qing Ni

RS-19**2.2A****Room 205****Uncertainty-Involved Structural Model Updating, Damage Assessment and Reliability Evaluation**

(Audrey Olivier, Marwan Debees)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	40	An uncertainty-aware multi-view approach to automated post-disaster damage assessment	Asim Bashir Khajwal, Chih-Shen Cheng, Arash Noshadravan
13:19:00 - 13:38:00	48	Measurement Optimization under Uncertainty using Deep Reinforcement Learning	Amin Jabini, Erik Johnson
13:38:00 - 13:57:00	66	Data-driven Uncertainty Quantification for Digital Twins based on Multi-level Modeling	Xinyu Jia, Costas Papadimitriou
13:57:00 - 14:16:00	114	Structural parameter identification under unknown seismic displacement inputs via the Transitional Markov chain Monte Carlo method	Yaohua Yang, Tomonori Nagayama
14:16:00 - 14:35:00	135	Probabilistic structural identification and prognosis of a full-scale bridge pier subjected to base excitation	Thalia Kontoroupi, Andrew Smyth, Audrey Olivier
14:35:00 - 14:54:00	282	Generality of nonparametric simultaneous identification approaches for nonlinear restoring force and mass with partial acceleration measurements	Ye Zhao, Bin Xu

JUNE 7 (TUESDAY)

RS-26

2.3A

Room 105

Innovative Technologies for System Integration, SHM Application, and Structural Performance Assessment

(Takehiko Asai, Matthew Bonney)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	15	Use of a Digital Twin for Remote Monitoring and Asset Management of Buildings	Matthew Bonney, Ruiyang Wang, David Wagg
13:19:00 - 13:38:00	20	Nonlinear model predictive control strategies for electromagnetic transducers with a tuned variable inerter	Takehiko Asai, Yuki Taketomi
13:38:00 - 13:57:00	93	Vibration Data Synthesis by using Finite Element Analysis and Artificial Neural Network	Youqi Zhang, Zhenkun Li, Rui Hao, Weiwei Lin, Lingfang Li, Di Su
13:57:00 - 14:16:00	102	Data-driven multi-rate transitioning for real-time hybrid simulation tests with large nonlinear numerical substructures	Diego Mera Muñoz, Fernando Gomez, Gaston Fernandois
14:16:00 - 14:35:00	128	Monitoring the Seismic Behavior of a Scaled RC Frame with Intermediate Ductility in a Shaking Table Test	Mohammad Vasef, Seyed Sina Shid-Moosavi, Peng "Patrick" Sun, Mohammad Sadegh Marefat
14:35:00 - 14:54:00	142	A deep learning approach for structural seismic response prediction using Temporal Fusion Transformers	Jiaxin Zhang, You Dong, Jing Qian
14:54:00 - 15:13:00	180	Study on the Influence of Joint Stiffness on the Stiffness of Overall Space Steel Structure	Cheng Yuan, Wei Lu, Jun Teng, Weihua Hu

RS-28-1

2.4A

Room 106

Application of Structural Health Monitoring techniques

(Elham Eslami)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	97	Electro-mechanical response of smart concrete block corresponding to different humidity	Tae Uk Kim, Dong Joo Kim
13:19:00 - 13:38:00	131	Research on Optimal Sensor Placement of Plane Tensile Membrane Structure Based on Particle Swarm Optimization Algorithm	Qiu Yu, Yingying Zhang, Ce Li, Junhao Xu, Yushuai Zhao, Penghao Yu
13:38:00 - 13:57:00	157	Damage detection of spatial steel structure based on temperature-induced strain	Jie Xu, Qian Ma, Xuan Liu, Dang Dazhi
13:57:00 - 14:16:00	166	Evaluation of the dynamic characteristics of a single-span prestressed concrete T-girder bridge before and after external prestressing	Sania Gohar, Tran Tien Dat, Yasunao Matsumoto
14:16:00 - 14:35:00	174	Research on damage identification of plane tensile membrane structure based on convolutional neural network	Ce Li, Yingying Zhang
14:35:00 - 14:54:00	190	Structural Identification and Monitoring of the Light Poles on the Skyway Span of San Francisco-Oakland Bay Bridge	Mohamed Abdelbarr, Mazen Wahbeh, Sami Masri
14:54:00 - 15:13:00	197	Damage Evaluation of Concrete Structures Undergoing Alkali-Silica Damage using Few-Shot Learning	Taeyong Shin, Hongbin Sun, Jinying Zhu, Ying Zhang

SS-02

2.5A

Room 107

Incomplete-data-driven Structural Health Monitoring, Damage Detection, and Condition Assessment

(Yang XU, Shiyang WEI)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	78	Output-only and real-time structural health monitoring	Marios Impraïmakis, Andrew Smyth
13:19:00 - 13:38:00	79	On the drop-out mechanism in dealing with SHM incomplete data	Shiyin Wei
13:38:00 - 13:57:00	82	Structural Health Diagnosis Under Limited Supervision: Data, Model, and Algorithm	Yang Xu, Hui Li
13:57:00 - 14:16:00	168	The Structural Force-bearing System Conversion Monitoring Method in Construction Unloading Phase	Wei Lu, Yizhan He, Weihua Hu, Jun Teng
14:16:00 - 14:35:00	184	Data-driven identification for vortex-induced vibrations with imbalanced data	Taeyong Kim, Sunjoong Kim

JUNE 7 (TUESDAY)			
14:35:00 - 14:54:00	209	Accelerated noncontact guided wave array imaging via sparse array data reconstruction	Homin Song, Yongchao Yang
14:54:00 - 15:13:00	271	A deep reinforcement learning-based method for structural failure modes searching	Xiaoshu Guan, Yuequan Bao

SS-09

2.6A

Room 108

Inspecting and Preserving Infrastructure through Robotic Exploration (INSPIRE)

(Genda Chen, Yang Wang)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	44	Vision-based Autonomous Inspection of Reinforced Concrete Buildings Leveraging RGB-D Fusion	Tarutal Ghosh Mondal, Mohammad Reza Jahanshahi
13:19:00 - 13:38:00	196	Delamination detection of concrete bridge deck through UAV-based infrared thermography	Haibin Zhang, Pu Jiao, Liujun Li, Zhenhua Shi, Bo Shang, Genda Chen
13:38:00 - 13:57:00	199	Evaluation of User-friendliness of Several UASs for Bridge Inspection	Zhenhua Shi, Bo Shang, Haibin Zhang, Liujun Li, Genda Chen
13:57:00 - 14:16:00	211	Mixed Reality Interface of Geospatial Data towards Efficient, Effective, and Reliable Bridge Inspection	Liujun Li, Genda Chen
14:16:00 - 14:35:00	213	Mixed Reality Enabled Digital Twin for Robot-assisted Bridge element Inspection and maintenance	Liujun Li, Genda Chen, Bo Shang
14:35:00 - 14:54:00	222	Development of Bridge Inspection Robot Deployment Systems (BIRDS)	Bo Shang, Liujun Li, Zhenhua Shi, Alec Reven, Pu Jiao, Boyang Li, Genda Chen
14:54:00 - 15:13:00	243	Mapping and Inspecting Culvert Robots	Brandon Gamble, Dylan Burns, Tian Xia, Dryver Huston

SS-10

2.7A

Room 110

Intelligent Sensing Technology for Civil Infrastructures

(He Zhang, Shunlong Li)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	2	Structural displacement estimation through the fusion of millimeter wave radar and accelerometer	Zhanxiong Ma, Jaemook Choi, Hoon Sohn
13:19:00 - 13:38:00	59	An Experimental Study of Subspace Identification using Recursive Formulation	Shieh-Kung Huang, Jun-Da Chen, Chin-Hsiung Loh
13:38:00 - 13:57:00	99	Field Validation of a Compact Martlet Wireless Ultrasonic Thickness Measurement System	Yu Otsuki, Peter Lander, Yang Wnag
13:57:00 - 14:16:00	266	Identification of Traffic Load on Bridges Using Machine Learning Method	Yuhui Zhou, He Zhang
14:16:00 - 14:35:00	250	Intelligent risk target sensing for anti-collision of bridges using computer vision	Yapeng Guo, Li Shunlong
14:35:00 - 14:54:00	253	A self-powered dynamic response sensing method driven by non-contact triboelectric nanogenerators	Kangxu Huang, Yuhui Zhou, He Zhang

SS-12

2.8A

Room 111

Structural Monitoring and Machine Learning in Wind Engineering: Wind and Wind Effects on Civil Structures

(Teng Wu, Shanwu Li)

Time	Paper #	Paper Title	Authors
13:00:00 - 13:19:00	249	Machine-Learning based Forecasting of Thunderstorm Winds Acting on Sutong Cable-Stayed Bridge	Tianyou Tao, Hao Wang, Peng Shi
13:19:00 - 13:38:00	89	Data-driven modeling of bridge vortex-induced vibration via a physics-guided machine/deep learning framework	Shanwu Li, Shujin Laima, Hui Li
13:38:00 - 13:57:00	177	Data-Driven Connection of Mean and Fluctuating Typhoon Wind Speeds based on Long-term Structural Health Monitoring Observations	Genshen Fang, Zihang Liu, Lin Zhao, Yaojun Ge
13:57:00 - 14:16:00	236	Automatic identification of vortex induced vibration of long-span bridges using kernel mean matching method	Jiale Hou, Xiaobing Xiong, Ensheng Ge, Chunfeng Wan, Youliang Ding, Songtao Xue
14:16:00 - 14:35:00	240	Super Resolution of Wind Pressure Field of Buildings using Deep Learning	Xiao Chen, Gang Hu, Chao Li, Yiqing Xiao

JUNE 7 (TUESDAY)			
14:35:00 - 14:54:00	248	Reinforcement learning-based shape optimization with deep learning-based effect predictions: an aerodynamic optimization method for bluff bodies	Yue Qin, Yi Hui, Ke Li

RS-23

2.1B

Room 207

Monitoring-based Performance Assessment of Infrastructure

(Enes Karaaslan, Furkan Luleci)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	55	Operational Modal Analysis with Blind Source Separation using Sparse Component Analysis: a comparison study	Mohammadamin Alibakhshi, Mohammadreza Rajaei, Maryam Bitaraf
15:49:00 - 16:08:00	161	Study on the Sensitivity of Structural Responses Caused by the Damaged Members of Spatial Grid Steel Structure	Wei Lu, Hongyun Guo, Weihua Hu, Jun Teng
16:08:00 - 16:27:00	183	Structural performance of prefabricated utility tunnel based on health monitoring	Jian Huang, Hengdong Wang, Jian Wang, Xin Xie
16:27:00 - 16:46:00	187	A mechanism to mitigate the accidents due to the Failures of Railroad Earthen Embankments, during heavy rainfall	Pankaj Kumar Agarwal
16:46:00 - 17:05:00	205	COVID-19 impacts on structural health monitoring market	Mahdi Safa, Brian Metrovich
17:05:00 - 17:24:00	207	Influence Mechanism of Initial Temperature Difference on Construction Response of Spatial Structure	Wei Lu, Xianwei Fang, Chunfeng Ao, Zongcheng Huo, Zhongmin Mei, Weihua Hu, Jun Teng
17:24:00 - 17:43:00	289	Condition Assessment of Pile Foundations Embedded in Soil	Wael Zatar

RS-24

2.2B

Room 205

Monitoring-based Life Cycle Assessment of Infrastructures

(Chinwendu Enyioha, Inad Alqurashi)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	185	Effects of Gap in Naturally Formed Semitruck Platoons on Long-term Performance of Flexible Pavement Structures: Numerical Modeling	Cheng Peng, Chengcheng Tao, Xiaoqiang Hu, Yi Jiang, Shuo Li
15:49:00 - 16:08:00	267	Fatigue crack detection of lifting-lug using deep-learning	Jinho Jang, Hoon Sohn
16:08:00 - 16:27:00	155	Optimal Infrastructure Maintenance based on the Dynamic Response Data and Deep Deterministic Policy Gradient	Lai Li, You Dong
16:27:00 - 16:46:00	179	Study on Ground Vibration Characteristics of Structures Adjacent to Road Tunnel	Wei Lu, Wanpeng Zhang, Weihua Hu, Jun Teng

RS-25

2.3B

Room 105

Monitoring-based Bridge Condition Assessment and Safety Warning

(Wei LU, Mostafa Iraniparast)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	56	Evaluation of Building Vibration Characteristics by Sequential Partial Measurement of Ambient Vibration	Aiko Kurisu
15:49:00 - 16:08:00	70	Vibration-Based Bridge Health Monitoring using Telecommunication Cables	Jingxiao Liu, Siyuan Yuan, Bin Luo, Biondo Biondi, Hae Young Noh
16:08:00 - 16:27:00	75	Bridge Condition Assessment Using Detrended Operational Measured Girder Distribution Factors	Masoud Sanayei, Claire Wright, Allen Marr
16:27:00 - 16:46:00	81	Probability Assessment of Bridge Fatigue Life Based on Loading of Influence Line by Elaborate Stochastic Traffic Flow	Donghui Yang, Zexin Guan, Tinghua Yi, Hongnan Li
16:46:00 - 17:05:00	110	Long-term Seismic Monitoring of Multi-span Highway Bridge and Bearing Malfunction Detection by Wireless Sensor Network	Dionysius Siringoringo, Yozo Fujino, Makoto Suzuki

JUNE 7 (TUESDAY)			
17:05:00 - 17:24:00	112	Vibration-based Damage Detection of an Actual Steel Plate Girder Bridge under Local Damage and Varying Temperature	Yoshiki Onaka, Takumi Hirooka, Chul-Woo Kim
17:24:00 - 17:43:00	221	Low Frequency Ultrasonic Transducers Wide Beam Spread	John Cotter, Tia Sayers, Rasim Guldiken

RS-32

2.4B

Room 106

Innovative Developments in Structural System Identification

(Arthur Huang, Antonio Maria D'Altri)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	8	Case Study: System Identification of a Phased Construction Bridge for Enhanced Deck Durability	Khalid Alkady, Christine Wittich
15:49:00 - 16:08:00	57	NSmos® A structural health monitoring system developed and operated by structural engineers	Nicolas Giron, Hirotaka Imaeda, Yusuke Sakai, Tatsuki Ishizaki, Kenta Hirai, Hiroaki Harada
16:08:00 - 16:27:00	58	Tallest RC tower building in Japan - Structural performance-based design and the Post-earthquake building damage estimation system	Hiroaki Kunitsu
16:27:00 - 16:46:00	98	A Fiber-Optic-Vibration-String Based Bridge Foundation Scouring Monitoring Sensor	Dongyu Zhang, Rong Zhang
16:46:00 - 17:05:00	160	Parameter Determination Method of Infill Wall Calculation Model Considering Stiffness Sensitive Factors	Wei Lu, Tianwei Zhang, Weihua Hu, Jun Teng
17:05:00 - 17:24:00	175	On the numerical modelling-based damage diagnostics in cultural heritage structures	Antonio Maria D'Altri, Branko Glisic, Stefano De Miranda
17:24:00 - 17:43:00	275	A study on the influence of the horizontal cracking on the modal parameters of Cabril dam. Experimental and numerical results	Sérgio Oliveira, André Alegre

RS-09

2.5B

Room 107

Structural Monitoring and Control of High-speed Railway

(Jian Li, Seyed Masoud Sajjadi Alehashem)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	80	Adaptive Nonlinear Suspension Control of Maglev Trains by Deep Reinforcement Learning	Qi Zhu, Su-Mei Wang, Yi-Qing Ni
15:49:00 - 16:08:00	151	Three-dimensional modelling and analysis of high-speed train-induced building vibration considering different soil types	Abdul Ahad Faizan
16:08:00 - 16:27:00	154	Experimental evaluation on broadband noise and vibration reduction performance of a novel rail particle damper through an in-situ test	Seyed Masoud Sajjadi Alehashem, Xin Ye, Chao Zhang, Yi-Qing Ni
16:27:00 - 16:46:00	163	Model development of a new rail particle damper and parameter optimization using FEM-DEM coupling approach	Chih-Shiuan Lin, Seyed Masoud Sajjadi Alehashem, Yu-Ling Wang, Yi-Qing Ni
16:46:00 - 17:05:00	254	Dynamic displacement monitoring of high-speed railway based on l1-norm sparse load reconstruction	Xin Wang, Li Shunlong
17:05:00 - 17:24:00	294	Sponge-supported triboelectric nanogenerator for harvesting energy and health monitoring of railway system	Jiqing Jiang, He Zhang, Xinjie Su
17:24:00 - 17:43:00	295	Origami-tessellation-based Triboelectric Nanogenerator for Energy Harvesting with Application in Road Pavement	Ying Yu, He Zhang

RS-15

2.6B

Room 108

Computer Vision-based Structural Health Monitoring

(Joe Kider, Mahta Zakaria)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	14	Monitoring Crack Development on Concrete Structures using Dynamic Vision Sensors	Seyed Sina Shid-Moosavi, Kevin Chase, Peng "Patrick" Sun, Kevin Mackie

JUNE 7 (TUESDAY)			
15:49:00 - 16:08:00	35	Developments of Artificial Intelligence Based Approaches for Metamaterial Design and Discovery	Rih-Teng Wu, Mehdi Jokar, Ting-Wei Liu, Mohammad Reza Jahanshahi, Fabio Semperlotti
16:08:00 - 16:27:00	41	AI on the Edge: Concrete Surface Defect Inspection Using Real-time AI-based Computer Vision Algorithms	Mahta Zakaria, Enes Karaaslan, Necati Catbas
16:27:00 - 16:46:00	116	Explainable convolutional neural networks for SHM based on transmissibility functions	Marc Parziale, Marco Giglio, Francesco Cadini
16:46:00 - 17:05:00	273	A Deep Neural Network for Multiclass Bridge Element Parsing in Inspection Image Analysis	Chenyu Zhang, Muhammad Monjurul Karim, Ruwen Qin
17:05:00 - 17:24:00	298	CrackSegmenter: An Advanced U-Net-Based Architecture for Robust Pavement Crack Segmentation	Elham Eslami, Hae-Bum Yun

RS-22

2.7B

Room 110

Practical Estimation of Structural Displacement and Its Applications

(Georgios Apostolakis, Mahta Zakaria)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	126	Towards Full-Field Sensing of 3D Deformation in Structural Components using Multi-Camera Photogrammetry	Seyed Sina Shid-Moosavi, Syed Zohaib Hassan, Peng "Patrick" Sun
15:49:00 - 16:08:00	134	Deflection Estimation of Highway Bridges Based on Acceleration Measurement Using a Machine Learning Approach	Atta E Mustafa, Tomonori Nagayama
16:08:00 - 16:27:00	146	Cyber-Physical Framework for Efficient Evaluation of Vision-based Displacement Tracking Systems	Shaik Althaf Veluthedath Shajihan, Tu Hoang, Kirill Mechitov, Bill Spencer
16:27:00 - 16:46:00	158	Structural Response And Earthquake Estimation With Limited Acceleration Measurements Considering Material Nonlinearity And Pounding	Uwais Ulde
16:46:00 - 17:05:00	204	SEISMIC PERFORMANCE EVALUATION OF THE TRADITIONAL WOODEN BUILDINGS FOCUSING ON THE DIFFERENCES IN STRUCTURAL CHARACTERISTICS	Maho Mitani, Atsuko Shirayama, Hiroki Ogawa, Junko Kanai
17:05:00 - 17:24:00	206	Study on the Mechanism of Complex Span Structure considering Construction Boundary Change	Wei Lu, Liqi Huang, Chunfeng Ao, Zongcheng Huo, Zhongmin Mei, Weihua Hu, Jun Teng
17:24:00 - 17:43:00	227	Temperature-induced deformation of multi-span suspension bridges	Yong Xia

SS-03

2.8B

Room 111

Advances in Computer Vision and Graphics for Structural Health Monitoring

(Mohammad Jahanshahi, Hui Li)

Time	Paper #	Paper Title	Authors
15:30:00 - 15:49:00	105	Multiscale Condition Assessment of Post-earthquake Buildings	Yu Wang, Yang Xu, Xin Jing, Liangyi Cui, Qiangqiang Zhang
15:49:00 - 16:08:00	125	A variational method for crack detection in robotic inspection	Erika Pellegrino, Tania Stathaki
16:08:00 - 16:27:00	159	AFFNet: Deep learning semantic segmentation network featuring attention mechanism for efficient crack detection on concrete structures	Jiaqi Hang, Yancheng Li, Tao Lai
16:27:00 - 16:46:00	193	Strain map based sub-surface damage detection using deep learning	Ashish Pal, Wei Meng, Satish Nagarajaiah
16:46:00 - 17:05:00	212	Augmented Reality Software Development for Infrastructural Inspection and Characterization	Kaveh Malek, Ali Mohammadkhorasani, Fernando Moreu
17:05:00 - 17:24:00	281	High-Fidelity Visual Structural Inspections through Transformers and Learnable Resizers	Kareem Eltoumy, Seyedomid Sajedi, Xiao Liang

JUNE 8 (WEDNESDAY)**RS-12****3.1A****Room 207****Infrastructure Inspection Using Unmanned Aerial and Ground Vehicles**

(Jeffrey Kauffman, Chao Sun)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	86	Measuring Reinforced Concrete Spacing Using RGB Camera and Unmanned Aerial Vehicle (UAVs)	Mahsa Sanei, Fernando Moreu
09:19:00 - 09:38:00	120	Digital Revolution Bridge Inspection Platform with AI, UAV, MR, and SfM for an advance Structural Health Monitoring	Katrina Mae Montes, Ji Dang, Pang-Jo Chun, Jiaming Liu
09:38:00 - 09:57:00	214	Aerial Manipulation using Embodied Human-Intelligence for Bridge Inspection and Maintenance	Dongbin Kim, Paul Oh
09:57:00 - 10:16:00	264	Consistent data acquisition method using CNN-based no-reference image quality assessment in bridge inspection using UAV	Gi-Hun Gwon, In-Ho Kim, Hyung-Jo Jung
10:16:00 - 10:35:00	279	Corrosion Detection in Highway Ancillary Structures Using Image Processing and Deep Learning Models	Amrita Das, Rajrup Mitra, Jack Heichel, Naima Kaabouch, Sattar Dorafshan
10:35:00 - 10:54:00	297	UAV Hyperspectral Imaging and Semi-Supervised Deep Learning of Complex Scenes in Structural Materials}	Shimin Tang, Zhiqiang Chen

RS-01**3.2A****Room 205****New Development of Smart Devices for Structural Control**

(Lukasz Jankowski, Chih-shiuan Lin)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	133	Study on Mechanical Properties of Large Rubber Bearings	Jingjing Liu, Song Pang, Jing Wu
09:19:00 - 09:38:00	170	Nonlinearities in inerter devices --- a historical perspective	David Wagg
09:38:00 - 09:57:00	261	Smart Superelastic Dampers in Dynamic Control of Civil Structures	Ileana Corbi, Ottavia Corbi, Francesca Tropeano
09:57:00 - 10:16:00	143	Accurate and Refined Strain-Sensing Smart Skin (S4) and its Advantages over Digital Image Correlation for 2D Non-Contact Strain Mapping	Wei Meng, Ashish Pal, Sergei M. Bachilo, Satish Nagarajaiah, R. Bruce Weisman
10:16:00 - 10:35:00	162	Nonconvex sparse regularization approach for efficient processing of ultrasonic NDT signals	Biao Wu, Hui Li
10:35:00 - 10:54:00	235	Dynamic energy harvesting and motion control of randomly excited MDOF structures via bi-objective optimally designed tuned mass damper inerter	Komal Rajana, Agathoklis Giaralis

RS-20**3.3A****Room 105****Vehicle-Bridge Interaction and Its Applications in Bridge-Weigh-in-Motion (BWIM), Damage Detection, and Bridge Management**

(Robin Eunju Kim, Masoud Sanayei)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	95	Bridge Weigh In Motion Using Operational Strain Measurements	Masoud Sanayei, Nathan Davis, Louis Ambrogio
09:19:00 - 09:38:00	124	The Use of the Forced Response due to a Truck Fleet for Structural Health Monitoring of Bridges	Kun Feng
09:38:00 - 09:57:00	140	Spatio-temporal Frequency Variation Analysis of Vehicle Bridge Interaction System: Considering Higher Bridge Frequency Interaction	Jaehun Lee, Robin Eunju Kim
09:57:00 - 10:16:00	223	Smart Indirect Damage Detection of Bridges Considering Operational Effects Through Mel-frequency Cepstral Coefficients Using Inverse Filtering Method	Nima Shirzad, Mustafa Gul
10:16:00 - 10:35:00	242	3D Dynamic Response of Short Stator Maglev Train-Track-Bridge System: Verification of Numerical Modelling Using Monitoring Data	Yang Lu, Su-Mei Wang, Shuo Hao, Gaofeng Jiang, Qi Zhu, Yi-Qing Ni

JUNE 8 (WEDNESDAY)

RS-28-2

3.4A

Room 106

Application of Structural Health Monitoring techniques

(Patrick Sun)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	226	Composite storage tank monitoring using a time-differential fiber optic BOCDA sensor	Il-Bum Kwon, Dae-Cheol Seo, Yong-Seok Kwon
09:19:00 - 09:38:00	238	Spectral finite element model for a curved beam with an edge crack using classical Love's shell-type theory	Syed Shabbir Ahamed, Jothi Saravnan Thiyagarajan, Goutam Mondal, Shanthanu Rajasekharan
09:38:00 - 09:57:00	241	Gaussian process-based non-uniform Fourier transform	Shuo Hao, Su-Mei Wang, Yi-Qing Ni
09:57:00 - 10:16:00	252	HLA: A Promising SHM Method Evaluating Current Structure State and Predicting Its Future	Mohammad Rabiepour, Cong Zhou, James Geoffrey Chase
10:16:00 - 10:35:00	259	COMPARATIVE ASSESSMENT ON MEASUREMENT AND MODELING ERRORS IN OPERATIONAL MODAL ANALYSIS	Çağlayan Hızal, Engin Aktaş

SS-15

3.5A

Room 107

Artificial Intelligence Tools and Methods for Resilient Transportation

(Mohamed Zaki, Zhibin Lin)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	60	Inexpensive road condition assessment using an RGBD-based deep convolutional encoder-decoder segmentation	Yu-Ting Huang, Mohammad Reza Jahanshahi
09:19:00 - 09:38:00	64	An Improved Unsupervised Novelty Detection Method Using Deep Auto-encoders for Real-time Assessing Operation Conditions of Overpasses	Zilong Wang, Qiang Tang
09:38:00 - 09:57:00	68	Application of Kriging Metamodeling in the prediction of the Gross Vehicle Weight for Bridge Weigh-In-Motion of an In-Service Highway Bridge	Pablo Agüero-Barrantes, Richard Christenson, Sergio Lobo-Aguilar
09:57:00 - 10:16:00	224	Graph Neural Networks for Efficient Seismic Reliability Analysis of Highway Bridge Systems	Tong Liu, Hadi Meidani

SS-04

3.6A

Room 108

Assessing Human-Infrastructure Interactions and Interfaces

(Fernando Moreu, Hae Young Noh)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	100	Study on Influence Mechanism of Vibration Comfort of Large-span Corridor Considering Tower Stiffness	Wei Lu, Shihua He, Jun Teng, Weihua Hu
09:19:00 - 09:38:00	195	Characterizing the Structural Influence on Footstep-Induced Structural Vibrations for Indoor Human Sensing	Yiwen Dong, Hae Young Noh
09:38:00 - 09:57:00	215	Vibration control realizations on a lightweight FRP footbridge	Iván M Díaz, Christian Gallegos-Calderón, José Ramírez-Senent, Christian A. Barrera-Vargas
09:57:00 - 10:16:00	217	Augmented Reality Application to Analyze Eye Movement during Structural Inspection	Saiqa Mustari Susmita, John-Wesley Hanson, Ali Mohammadkhorasani, Fernando Moreu

SS-14

3.7A

Room 110

Challenges in Distributed Coordination for Smart Structural Health Monitoring (SHM)

(Chinwendu Enyioha, Shaurya Agarwal)

Time	Paper #	Paper Title	Authors
09:00:00 - 09:19:00	107	Cable Force Monitoring by Distributed Fiber Optic Sensor with Two Installation Schemes	Yanping Zhu, Genda Chen
09:19:00 - 09:38:00	228	Intelligent Monitoring System for Weld Root of Steel Box Girder of Hong Kong-Zhuhai-Macao Bridge	Wentao Wang, Jerome Lynch, Bin Han, Jianing Wang, Jingtang Xu, Guangyou Mu, Yang Li
09:38:00 - 09:57:00	276	Time synchronization of a vibration-based wireless SHM system	Matthieu Perrault, Laurent Guérineau, Jérôme Laine
09:57:00 - 10:16:00	280	Distributed Structural Health Monitoring: Challenges and Opportunities	Chinwendu Enyioha, Shaurya Agarwal, Peng "Patrick" Sun



8WCSCM

Mini- Symposia

Mini Symposium, MS-1 (Monday, June 6 13:00 - 14:30, Auditorium Room 101)

Synopsis: This mini symposium aims to provide opportunities to (i) get guidance on how to navigate through the first few years of academic and research career, (ii) share experience and wisdom of pursuing academic and research career paths, and (iii) network with peers and experts in structural control and monitoring fields, form mentor-mentee relationships. This symposium is specially to help junior members of our community, including graduate students, postdocs, and early-career faculty. Topics include but are not limited to advice for career paths (universities, national labs, government & industry) for those at different career levels (graduates, postdocs & junior faculty), emerging research trends and topics, job preparation and application tips, relationships with advisors and colleagues, and diversity and inclusion. Our panelists consist of field experts at various stages in academia and national laboratories. They will share their useful career experiences and insights through short presentations followed by a Q&A session. To provide opportunities to have in-depth discussions on specific topics, we will hold small group sessions for in-person attendees and Zoom breakout rooms for virtual attendees. We hope this symposium will provide opportunities for people to meet and better understand and nurture our community.

(* Small group sessions will be held at different time slots by region considering local time of participating mentors and mentees. Small groups schedule is to be posted on the 8WCSCM website.

Panelists:

- **Dr. Chuck Farrar**, Engineering Institute Leader of National Security Education Center, Los Alamos National Laboratory, U.S.A.
- **Dr. Mohammad Jahanshahi**, Associate Professor of Civil Engineering, Purdue University, U.S.A.
- **Dr. Haeyoung Noh**, Associate Professor of Civil and Environmental Engineering, Stanford University, U.S.A.
- **Dr. Audrey Olivier**, Assistant Professor of Civil Engineering, University of Southern California, U.S.A.

Moderator:

- **Dr. Hae-Bum (Andrew) Yun**, Associate Professor of Civil Engineering, University of Central Florida, U.S.A.

Mentors in Small Group Sessions:

- **ZhiQiang Chen**, Associate Professor, School of Computing and Engineering, University of Missouri-Kansas City, U.S.A.
- **Mustafa Gul**, Associate Professor of Civil and Environmental Engineering, University of Alberta, Canada
- **Meidani Hadi**, Associate Professor of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, U.S.A.
- **Erik Johnson**, Professor of Civil and Environmental Engineering, University of Southern California, U.S.A.
- **Chul-Woo Kim**, Professor of Civil & Earth Resource Engineering, Kyoto University, Japan
- **Robin Eunju Kim**, Assistant Professor of Civil & Environmental Engineering, Hanyang University, South Korea
- **Jun Li**, Associate Professor, Civil and Mechanical Engineering, Curtin University, Australia
- **Audrey Olivier**, Assistant Professor of Civil Engineering, University of Southern California, U.S.A.
- **David Wagg**, Professor of Mechanical Engineering, University of Sheffield, U.K.
- **Yongchao Yang**, Assistant Professor of Mechanical Engineering, Michigan Technological University, U.S.A.

Panelists

Moderator



Chuck Farrar
LANL, U.S.A.



Mohammad Jahanshahi
Purdue University, U.S.A.



Audrey Olivier
University of Southern
California, U.S.A.



Haeyoung Noh
Stanford University, U.S.A.



Hae-Bum Yun
University of Central
Florida, U.S.A.

Mini Symposium, MS-2 (Tuesday, June 7 13:00 - 14:30, Auditorium Room 101)

Synopsis: Smart Cities are interconnected complex systems including components such as people, built environment, operations, economic and social-organizational aspects. Smart cities will combine sensing, communications, and management technologies to create urban environments that are adaptable, connected, able to be monitored at any given time and focused on the achievement of a specific set of objectives. As technology continues to transform the infrastructure sector, artificial intelligence, sensing, the Internet of Things, and various in-sight era technologies provide emergent opportunities for smart cities to improve quality of lives of people, improve efficiency in operations and contribute to “green communities”. New generation of smart cities can take advantage of such developments while recognizing that natural, technological, and human-caused hazards, pandemics can take a high toll on communities, costing in lives, livelihoods and quality of life if such disaster risks are not considered and managed. Some of the major cities such as New York, Las Vegas, Orlando in the USA also receive large number of visitors/tourists contributing greatly to local and state economies. Tourism businesses may need to prepare challenges such revisioning, leading, coordinating, and planning tourism destinations for destination marketing and management organizations in a smart city. Therefore, smart tourism is a part of the interconnected smart city system.

Given the abovementioned challenges, how should different stakeholders for such cities address these complex systems issues? What and how emergent technologies could facilitate the transition towards a resilient, economically and socially vibrant smart city with smart tourism? The Smart Cities and Smart Tourism Mini-symposium will gather experts with backgrounds in built infrastructure, novel technologies, tourism industry to discuss the opportunities challenges of smart city and smart tourism development and unpack existing technological trends and advances. The expert panelist listed below will bring their own perspectives to Smart City concepts and implementations especially considering major cities have to consider smart tourism as an integral part of the economy, people, and operations along with built environment and advanced technologies.

Panelists (tentative):

- **Dr. Andrew Smyth**, Professor of Civil Engineering & Chair of the Smart Cities Center, Columbia University, U.S.A.
- **Dr. Therese McAllister**, Community Resilience Group Leader, National Institute of Standards and Technology (NIST), U.S.A.
- **Ms. Mital Hall**, PMP, LEEd AB O+M, CC-P, Vice President, ecoPreserve Inc., U.S.A.
- **Mr. Jeff Benavides** Chief Sustainability & Resilience Officer at Orange County, Orange County, Florida, U.S.A.

Moderators:

- **Dr. Arthur Huang**, Assistant Professor, Rosen College of Hospitality Management, University of Central Florida
- **Dr. Necati Catbas**, Professor, College of Engineering and Computer Science, University of Central Florida

Panelists



Andrew Smyth
Columbia University,
U.S.A.



Therese McAllister
NIST, U.S.A.



Mital Hall
ecoPreserve Inc.
U.S.A.



Jeff Benavides
Orange County
Government, U.S.A.



Arthur Huang
University of Central
Florida, U.S.A.



Necati Catbas
University of Central
Florida, U.S.A.

Moderator

Gold Sponsor



BBM Structural Engineers, Inc. was incorporated in 1984 and is currently celebrating 38 years in business. The firm employs 28 professionals in two offices: Orlando (23 employees) and Boca Raton, FL (5 employees).

Employee breakdown includes 7 licensed professional engineers, 5 engineering interns, 11 CAD / BIM technicians, 2 construction administration personnel and 3 administrative people. With over 100 years of combined experience among our principals, BBM is a leader in structural engineering consulting, delivering over 7,000 projects total across a variety of industries and located in more than 44 states and territories. Our solutions are versatile, efficient and creative, as we continually strive to be at the leading edge of structural engineering practice.

BBM has used Revit, by Autodesk since 2007. Revit is the frontrunner in Building Information Technology (BIM) and when utilized by architects and engineering consultants, a uniform and coordinated model results where any conflicts between the disciplines are able to be readily recognized and solved. In addition, during the construction phase, the CM is able to coordinate various trades using the 3-D model to minimize field challenges and / or identify conditions that must be addressed prior to construction being completed in those areas. Our engineers use the following industry standard, sophisticated structural analysis / design software: RAM Structural System, RAM Elements, RAM Concepts, Tekla Structural Designer, and TEDDS.

BBM's engineers are registered in 44 states: Alabama, Arizona (SE), Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii (SE), Idaho (SE), Illinois (SE), Indiana, Iowa, Kansas, Kentucky, Louisiana (SE), Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Nebraska (SE), Nevada (SE), New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon (SE), Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington (SE), West Virginia, and Wyoming; and 3 territories: Guam (SE), Puerto Rico, and the United States Virgin Islands. Principals Bora Erbilien, Luis Bedoya, and Kevin Casey hold national NCEES registration.



In addition, Bora Erbilien and Kevin Casey were named Fellows of the Structural Engineering Institute (SEI) and both earned their Fellowship of the SEI of the American Society of Civil Engineers (ASCE). Kevin is also designated as a Chartered Member (MIStructE) in the institution of Structural Engineers based in the UK. Bora Erbilien also holds NCEES 'Model Law Structural Engineer' designation and is a registered engineer in Grenada.

Explore more about BBM Structural Engineers, Inc. at www.bbmstructural.com

Orlando Office: 2300 Maitland Center Parkway, Suite 201 Maitland, FL 32751
Phone number: (407) 645-3423.

Silver Sponsor

RIEGL is an international leading provider of cutting-edge technology in airborne, mobile, terrestrial, industrial, and unmanned laser scanning solutions for applications in surveying.

RIEGL has been producing LiDAR systems commercially for over 40 years and focuses on pulsed time-of-flight laser radar technology in multiple wavelengths.

RIEGL's core Smart-Waveform technologies provide pure digital LiDAR signal processing, unique methodologies for resolving range ambiguities, multiple targets per laser shots, optimum distribution of measurements, calibrated amplitudes, and reflectance estimates, as well as the seamless integration and calibration of systems.

RIEGL's Ultimate LiDARTM 3D scanners offer a wide array of performance characteristics and serve as a platform for continuing Innovation in 3D for the LiDAR industry.

From the first inquiry, to purchase and integration of the system, as well as training and support, RIEGL maintains an outstanding history of reliability and support to their customers.

Worldwide sales, training, support, and services are delivered from RIEGL's headquarters in Austria and in the USA; main offices in, Japan, China, Australia, Canada, and the UK; and a worldwide network of representatives.



Bronze Sponsor



OTR is a mobile application striving to bring communities together and make driving a better experience for everyone. This solution will provide a hands-free reporting system with which users can report any inconveniences on the road and get rewarded for doing so!




These reports will then be sent to the correct authorities so that they can properly respond to the issues in a timely and effective manner. Common road sightings such as potholes, uneven surfaces, and roadkill are a nuisance to all drivers, so let's work together to fix them. Additionally, we'd like to add features such as customization in route planning and updates about your route before you start driving. We'd love to hear your feedback!

Notes

SPONSORS:



FOR MORE INFORMATION:

 8WCSCM.ORG
 SECRETARIAT@8WCSCM.ORG
 +1 (407) 823-0176

University of Central Florida
International Association of
Structural Control & Monitoring

