The Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities (MAIREINFRA2)

August 16 - 19, 2023, Honolulu, Hawaii
Mid-Pacific Conference Center
Hilton Hawaiian Village Waikiki Resort

Co-Organizers:

Sponsors:

Gold Level:

Silver Level:

Bronz Level:

Official Endorsements:

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Welcome to MAIREINFRA2 from Chairman Hosin “David” Lee

It is my honor to serve as chairman of the Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities (MAIREINFRA2) with supports from International Society for Maintenance and Rehabilitation of Transport Infrastructures (iSMARTi), Laboratory for Advanced Construction Technology (LACT) of Iowa Technology Institute at the University of Iowa and SMARTI Lab at University of Parma. The objective of this series of conferences is to provide a forum for researchers, government employees, consultants, and contractors to exchange technological advancements and innovations for maintaining and rehabilitating sustainable and resilient infrastructures, which include roads, bridges, railroads, and buildings.

The sustainable and resilient maintenance and rehabilitation of constructed infrastructure facilities is a backbone of economic prosperity and public welfare. But the sustainability and the resiliency challenges engineers and builders to respond creatively to a new paradigm shift in rehabilitating and maintaining constructed infrastructure facilities in the most environmentally friendly manner by lowering the energy cost, enhancing the safety, and minimizing air and water pollution. Three main themes of MAIREINFRA2 are: 1) maintenance and rehabilitation of pavements, 2) automation/innovations in bridge/building construction, and 3) safety, disaster resilience and sustainability.

This conference features:

- World-famous keynote and invited speakers in plenary sessions and podium and poster presentations in three technical tracks.
- Over eighty papers from seventeen countries in three technical tracks of 1) asphalt pavements, 2) concrete pavements, bridges, and buildings and 3) safety, resilience, and sustainability.
- Many networking opportunities that include Wednesday’s welcoming reception at Rainbow Suite and Patio; Thursday’s lunch and welcoming dinner, Friday’s lunch and closing banquet at Mid-Pacific Conference Center located on top of a parking structure and Saturday Hawaiian cultural tour.

Finally, I would like to thank corporate sponsors and participants from all over the world who convened in Honolulu, Hawaii to share their knowledge and experiences in maintaining and rehabilitating resilient and sustainable infrastructure facilities. It is my honor and privilege to host MAIREINFRA2 in the smart city of Honolulu.

I would like to hear when we depart “I cannot wait until we meet again at the 10th International Conference on Maintenance and Rehabilitation of Pavements in Guimaraes, Portugal, on July 24-26, 2024 and the Second International Conference on Smart Cities in Tirupati, India, on February 19-21, 2025.”

Hosin “David” Lee, Chairman of MAIREINFRA2
Immediate Past President of iSMARTi

Welcome to MAIREINFRA2 from President Joao Virgilio Merighi

One of the pillars of the Planet's sustainability is its infrastructure, which must be designed, built, operated and conserved through maintenance and rehabilitation, with responsibility and respecting the environment.

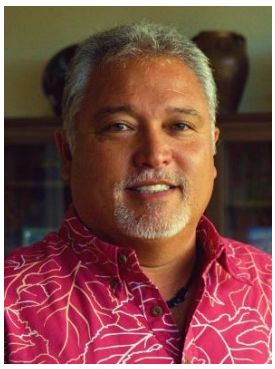
Therefore, dear friends, it is with great satisfaction that, as founder and current President of the International Society for Maintenance and Rehabilitation of Transport Infrastructures (iSMARTi), we are going to see the Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities (MAIREINFRA2) in Honolulu, Hawaii, USA, in August, 16-19, 2023 under the idealization and command of our dear and appreciated professor Hosin "David" Lee, bringing together professors, engineers, researchers, industries and managers; either governments or concessionaires of the infrastructure of our Planet and collaborating from the technology transfer to its innovation.

The MAIREINFRA2 Conference is supported by iSMARTi, Laboratory for Advanced Construction Technology (LACT) of Iowa Technology Institute at the University of Iowa and SMARTI Lab at University of Parma. Aware of the need to improve and innovate the infrastructure and its maintenance/rehabilitation, Prof. Hosin "David" Lee, took an important responsibility for organizing this conference, managing to involve 20 countries with more than 80 papers, with its Organizing Committee involving 13 countries and 22 members and the Technical Committee involving 7 countries and 27 members.

Finally, I would like to express our gratitude to 3 selfless colleagues, who, from the first international symposium of maintenance and Rehabilitation of pavements and Technological Control in Sao Paulo, May 2000, turned a simple symposium into an internationally recognized society. They are: the illustrious professor, Waheed Uddin of University of Mississippi (in memoriam), who, since May 22, 2000, was enthusiastic about the first symposium; Prof. Rita Fortes of Instituto Federal de São Paulo and Dr. E. Ray Brown from (NCAT) at Auburn University who managed to stimulate and carry out the second symposium that today is synthesized as iSMARTi.

Joao Virgilio Merighi, President of iSMARTi

Welcoming Remarks from Dean Brennon T. Morioka



Aloha to all of our guests here to our islands attending MAIREINFRA2. We hope that the conference is informative and educational but also productive for all in building and cultivating the relationships necessary to build a stronger network of industry professionals focused on critical infrastructure which is key to most of our world's economies. But we also hope that you will take some time to enjoy the gifts that Hawaii has to offer in terms of our natural resources as well as our people. You will not find a more welcoming culture in the world compared to Hawaii.

As we all have come to know, successful planning, design, construction and maintenance of efficient, sustainable, and resilient infrastructure is dependent on innovation and collaboration. We must have the courage to try new things and embrace new approaches. And this is often made easier when we have strong partnerships with common visions and organizational cultures. Here in Hawaii, we are fortunate to have that with both our College of Engineering at the University of Hawaii at Manoa and our key partner, the State of Hawaii Department of Transportation (HDOT).

The College of Engineering is proud of the proactive research we are doing on critical infrastructure on behalf of HDOT and other state and county government agencies, looking at how to better build and maintain what we have as well as prepare for what may come in terms of the effects of climate change and sea level rise. Our partnership with HDOT to assist in meeting Hawaii's goals and supporting its initiatives has never been stronger and we look to continue to further integrate our work even further over the coming years.

Not only is the College of Engineering HDOT's primary partner for research and piloting new technologies, materials, and systems, we are looking to offer greater service in how we both operate and provide opportunities to our local engineering community. Over the last year, HDOT has tasked the College to serve as its provider for their Local Technical Assistance Program (LTAP) and have also recently launched Hawaii's first connected autonomous vehicle pilot in Hawaii, starting with the UH Manoa campus with plans to expand out into our local communities. The College has never been more committed and focused on working to solve local issues that we believe are transferable to solutions that can be utilized around the Pacific if not the world.

We look forward to what MAIREINFRA2 will teach us over the course of the next few days and what it can offer towards building our network and understanding in these fields. We hope the relationships built here in Hawaii will be of benefit to all attendees.

Brennon T. Morioka, Dean of College of Engineering
University of Hawai'I at Manoa

Welcoming Remarks from Senior Scientific Tech. Manager Jeb S. Tingle

I would like to welcome all of the attendees to the Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities (MAIREINFRA2). This conference offers a unique opportunity to engage in meaningful dialogue on new resilient and sustainable methods for maintaining, repairing, and rehabilitating transportation infrastructure.

The deteriorated state of our existing infrastructure has been well documented. Many sources suggest that the decline in the condition of existing infrastructure is due to a lack of adequate funding and the reliance on legacy maintenance and repair methods that are no longer effective. The U.S. Infrastructure Investment and Jobs Act (2022) provides $1.2 Trillion in funding over five years to help develop resilient and sustainable infrastructure. Thousands of new infrastructure projects have already been funded including repaving roads, upgrading deteriorated water systems, restoring structural capacity of bridges, and improving mass transit systems. While this new funding will not restore the condition of all of the U.S.'s deteriorated infrastructure, it will provide a needed influx of new funding to help agencies and officials begin to address the Nation's sustainability and the resiliency challenges. This Act demonstrates a new tangible focus on infrastructure that we as owners, operators, and practitioners should take advantage of.

I would like to challenge all conference attendees to take this opportunity to share new ideas, explore new technologies, and consider a fundamental paradigm shift in how we plan and execute infrastructure maintenance, repair, and rehabilitation projects. Let's step out of our comfort zones, meet new people, exchange information, and build new relationships that will enable us to be more effective in addressing current and future infrastructure problems.

Enjoy the conference!

Jeb S. Tingle, Senior Scientific Technical Manager (SSTM)
U.S. Army Engineer Research and Development Center

Organizing Committee

Taha Ahmed, Australian University-Kuwait, Kuwait
Ioannis Brilakis, Univerity of Cambridge, UK
Filippo Giustozzi, RMIT University, Australia
Kyong Ju Kim, Chung-Ang University, Korea
Seong-Min Kim, Kyung-Hee University, Korea
Tae-Hwan Kim, Yong-In University, Korea
Soo-Ahn Kwon, KICT, Korea
Mike LaViolette, HDR, USA
Hosin "David" Lee, University of Iowa, USA
Seonha Lee, Kongju University, Korea
Davide Lo Presti, University of Palermo, Italy
Joao Merighi, Latersolo, Ltda, Brazil
Byungkyu Moon, ARA, Inc., USA
Athanassios Nikolaides, Aristotle University of Thessaloniki, Greece
Ghim Ping Ong, National University of Singapore, Singapore
Brian Park, University of Virginia, USA
Paulo Pereira, University of Minho, Portugal
Krishna Prapoorna, Indian Institute of Technology Tirupati, India
Omar Smadi, Iowa State University, USA
Bo Song, Beijing Institute of Technology, China
Susan Tighe, McMaster University, Canada
Haifang Wen, Washington State University, USA
Jon Young, HAPI, USA

Technical Committee

Serji Amirkhanian, University of Alabama, USA
Adrián Ricardo Archilla, University of Hawaii, USA
Gabriella Buttitta, University of Palermo, Italy
Carlos Chang, Florida International University, USA
Chunhee Cho, University of Hawaii, USA
Yoon-Ho Cho, Chung Ang University, Korea
Rita Fortes, Instituto Federal de São Paulo, Brazil
Gaspare Giancontieri, University of Palermo, Italy
Sungdo Hwang, KICT, Korea
John Harvey, UC Davis, USA
Byung-Suk Kim, KICT, Korea
Hee-Jeong Kim, University of Arizona, USA
Sung-Hee Sonny Kim, University of Georgia, USA
Seung Woo Lee, Kangneung-Wonju National University, Korea
Jenny Liu, Missouri S&T, USA
Sue McNeil, University of Delaware/University of New South Wales, Australia
Young-Jun Moon, KOTI, Korea
Jorge Pais, University of Minho, Portugal
Jee Woong Park, UNLV, USA
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Aravind Swamy, Indian Institute of Technology Delhi, India
Jeb Tingle, US Army ERDC, USA
David Woodward, Ulster University, UK
Zhanping You, Michigan Tech., USA
Kyong-Ku Yun, Kangwon National University, Korea
Xiong Zhang, Missouri S&T, USA

Technical Program

WEDNESDAY, August 16, 2023

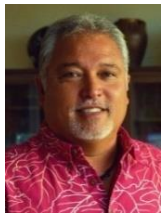
5:00 pm – 7:00 pm Rainbow Suite and Patio	**Ice Breaker (complimentary hors d'oeuvre and beer)** **at Rainbow Suite and Patio (Ground floor of Rainbow Tower facing the Ocean)** **Pick up Nametag, Program, Hawaiian Shirt and Bag**

THURSDAY, August 17, 2023

Track A Asphalt Pavements and Maintenance (South Pacific Suite 1)

Track B Concrete Pavements, Bridges and Buildings (South Pacific Suite 2)

Track C Traffic Safety, Resilience, and Sustainability (Sea Pearl 1&2)

8:00 am – 8:30 am	**Registration (breakfast on your own)**	
8:30 am –9:00 am South Pacific 1&2	**Welcoming Remarks Presided by Hosin "David" Lee, University of Iowa**	
	 **Hosin "David" Lee**, Chairman of MAIREINFRA2, Immediate Past President of iSMARTi and Professor of University of Iowa	 **Joao Merighi,** President of iSMARTi and the founder/technical director of Latersolo Engineering and Services in Brazil and South America
	 **Brennon Morioka,** Dean of the College of Engineering at the University of Hawai'i at Mānoa	 **Jeb S. Tingle,** Senior Scientific Technical Manager in the Geotechnical and Structures Laboratory at the U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi
9:00 am – 10:10 am South Pacific 1&2	**Keynote Presentations Presided by Imad Al-Qadi, University of Illinois at Urbana Champaign**	
	 **John Harvey,** Professor of Civil and Environmental Engineering at the University of California, Davis, Director of the UC Pavement Research Center and the City and County Pavement Improvement Center. **Presentation Title:** Improving pavement sustainability through integrated design, construction, asset management, LCA, LCCA, and S-LCA	 **Ed Sniffen,** Director of Hawaii department of Transportation. He has served as the chair of the AASHTO Committee on Transportation System Security and Resilience. **Presentation Title:** Driving Innovation: The influence of forecasted conditions and state priorities on project selection, design, and material choice
10:10 am – 10:30 am	**Coffee Break (Visit Exhibition Booths)**	

10:30 am – 12:00 pm

South Pacific 1

Session A.1 Asphalt Materials

Session Chair: Davide Lo Presti, University of Palermo

A.1.1 Preliminary mechanical characterization of HMA mixtures with a high content of recycled materials, Giulia Tarsi and Cesare Sangiorgi, University of Bologna (Italy)

A.1.2 Bio-oils as asphalt bitumen rejuvenators, Amir Tabaković, Netherlands Organization for Applied Research (TNO)/Delft University of Technology; Dave van Vliet, Kirsten Roetert Steenbruggen, and Greet Leeghwater, Netherlands Organization for Applied Research (TNO). (Netherlands)

A.1.3 Development of Plant-Mix Type Modified Mixture with Excellent Flexibility and Stress Relaxation Property for Ensuring High Resistance to Cracking, Nhat Thanh Tran and Masashige Aoki, Taisei Rotec Corporation (Japan)

A.1.4 Design and Evaluation of Ultra-Thin Overlay with High Viscosity and High Elasticity, Yijia Chen, Zhi Liao, Lide Chen, Road Intellitech Co.; Tao Ma, Southeast University; Susan Tighe, Li Ningyuan, McMaster University (China/Canada)

South Pacific 2

Session B.1 Bridge Construction and Evaluation

Session Chair: Seok Hong Lee, SN Construction Co.

B.1.1 Full Load Test for the Sheikh Jaber Al-Ahmad Al-Sabah Causeway Bridge (PSC Girder: 35M), Kwangsoo Kim, AI Safety Institute; Dooyong Cho, Chungnam National University; Raechul Lee, Sangcheol Lee, SQ Engineering; Joungyong Park, Korea Construction Disaster-Prevention Research; Wonrak Jang, AI Safety Institute (Korea)

B.1.2 Accelerated Bridge Construction on Maui's Hana Highway, Sean Oroho, HDR Inc. and Tom Kubicz**,** Federal Highway Administration (USA)

B.1.3 Field Application of Hydro-Demolition and Dry-Mix Shotcrete for Repairing the Understructure of Bridge Deck, Kyong-Ku Yun, Seunghak Choi, Taeho Ha, Changseok Song, Mohammad Shakhawat Hossain, Valerii Panov, Kangwon National University; Yonggon Kim, Daesang E&C (Korea)

B.1.4 Accelerated Construction of Unbraced Network Arch Bridge Using SPMTs, Mike LaViolette, HDR., Inc. (USA)

Sea Pearl 1&2

Session C.1 Asset and Risk Management

Session Chair: Ji Yun Lee, Washington State University

C.1.1 Asset Management Decision Support Tools: Computational Complexity, Transparency and Realism, Babatunde Atolagbe, University of Delaware; Sue McNeil, University of Delaware/University of New South Wales (USA/Australia)

C.1.2 Multi-Parametric Delineation Approach for Homogeneous Sectioning of Asphalt Pavements, Naga Siva Pavani Peraka, GMR Institute of Technology; Krishna Prapoorna Biligiri, Satyanarayana N. Kalidindi, Indian Institute of Technology Tirupati (India)

C.1.3 A Framework for Smart Pavements in Canada, Pejoohan Tavassoti, Hassan Baaj, Moojan Ghafurian, University of Waterloo; Omran Maadani, Mohammad Shafiee, National Research Council Canada (Canada)

C.1.4 Development and Implementation of a Multihazard Risk Management System for Road Networks: volcanic, seismic and hydrometeorological hazards in Chile," Alondar Chamorro, Pontifica Universidad Católica de Chile (Chile)

12:15 pm – 12:45 pm

South Pacific 1&2

Invited Presentation

Lori Kahikina, Executive Director and CEO
Huy Huynh, Director of Core Systems
Honolulu Authority for Rapid Transportation (HART)

"Honolulu Rail Transit Project Update"

12:45 pm – 1:30 pm

Lunch Buffet

1:30 pm – 3:00 pm South Pacific 1		**Session A.2 Asphalt Pavement Texture and Aging** **Session Chair: Haifang Wen, Washington State University** **A.2.1 Re-evaluating the Risk of Using Higher Skid Resistance Aggregates**, David Woodward, Phillip Millar, and Paul Sargent, Ulster University (UK) **A.2.2 Toward the Determination of the Appropriate Capturing Resolution of Surface Textures in Relation to Pavement Friction,** Malal Kane and Minh-Tan Do, Université Gustave Eiffel (France) **A.2.3 Rheological and Aging Characteristics of Polymer-modified Asphalt with Addition of Sulfur,** Ana Luiza Rodrigues, Caio Falcão and R. Chris Williams, Iowa State University (USA) **A.2.4 Sun Damage on Roads: from UV Radiation to Bituminous Binders and the Protecting Effect of End-of-Life Tires,** Marie Enfrin, RMIT University; Jaffer Bressan Borinelli, Johan Blom, Cedric Vuye, University of Antwerp; Filippo Giustozzi, RMIT University (Australia)
South Pacific 2		**Session B.2 Sensing and Machine Learning for Structures** **Session Chair: Lu Gao, University of Houston** **B.2.1 3D Printing Technique for Passive Wireless Strain Sensing**, Joshua Dyogi, Xi Song, University of Hawaii at Manoa; Sung-Hwan Jang, Hanyang University; Sang-Hyeok Nam, ENGSOFT Co.; and Chunhee Cho**,** University of Hawaii at Manoa (USA/Korea) **B.2.2 CNN-based Automatic Mobile Reporting System and Quantification for Concrete Crack Size of Precast Members of OSC Construction**, Ali Akbar, James Mugo Njoroge, Seojoon Lee, Younghee Chang and Soonwook Kwon, Sungkyunkwan University (Korea) **B.2.3 Prediction of Ultimate Bond Strength between UHPC and Titanium Alloy Bars using a Machine Learning Approach,** Mahesh Acharya, Idaho State University; Luis Bedriñana, Universidad de Ingenieria y Tecnologia; Jared Cantrell, Ankit Bhaukajee, Mustafa Mashal, Idaho State University (USA/Peru) **B.2.4 Optimizing Pothole Detection in Pavements: A Comparative Analysis of Deep Learning Models,** Tiago Tamagusko and Adelino Ferreira, University of Coimbra (Portugal)
Sea Pearl 1&2		**Session C.2 Traffic Safety** **Session Chair: Ghim Ping Ong, National University of Singapore** **C.2.1 Safety Assessment of Cooperative Platooning in Mixed Traffic,** B. Brian Park, University of Virginia; Hyejin Lee, Seoul National University; Ilsoo Yun, Ajou University; Jeehyung Park, The Korea Transport Institute (USA/Korea) **C.2.2 Comparison Between Two Different Deployment Types of Road-side Devices Reducing Incident-Related Potential Conflicts**, Jae-Hyeong Lee and Jin-Tae Kim, Korea National University of Transportation (Korea) **C.2.3 Analysis of LDWS Recognition Rate According the Aging of Road Marking**, Soon Yong Park and Sung Bum Yun, Seoul Institute of Technology (Korea) **C.2.4 Infrastructure Measures to Protect the Unrecognized Vulnerable Road User: Motorcyclists,** Georgene M Geary, GGfGA Engineering (USA)
3:00 pm – 3:30 pm		**Coffee Break (Visit Exhibition Booths)**

3:30 pm – 5:00 pm South Pacific 1	**Session A.3 Asphalt Pavement Evaluation** **Session Chair**: **Orazio Baglieri, Politecnico di Torino** **A.3.1 Study of Long-Term Field Performance of Chip Seal in Washington**, Angelique Umutoniwase; Washington State DOT; Haifang Wen, Kevin Littleton, Washington State University (USA) **A.3.2 Evaluation of Longitudinal Irregularity in Airport Pavements and unpaved Runway,** Livia Merighi, Claudia Pereira, and Jose Schiavon, Aeronautics Institute of Technology (Brazil) **A.3.3 Laboratory Evaluation of Recycled Asphalt Pavement and Engineered Polymer Binder for Small Airfield Repairs,** William D. Carruth, Webster C. Floyd, and Jeb S. Tingle, U.S. Army Engineer Research and Development Center (USA) **A.3.4 Optimized Selection of Pavement Maintenance and Rehabilitation Techniques: A Comparative Life Cycle Assessment,** Imad L. Al-Qadi and Qingwen Zhou, University of Illinois Urbana-Champaign (USA - No Paper)
South Pacific 2	**Session B.3 Innovative Bridges and Buildings** **Session Chair:** Tom Kubicz, Federal Highway Administration **B.3.1 Pullout Behavior of Titanium Alloy Reinforcing Bars in Ultra-High Performance Concrete**, Mahesh Acharya, Jared Cantrell, and Mustafa Mashal, Idaho State University (USA) **B.3.2 Benchmarking Material Use Efficiency for Building Projects**, Jiyong Choi, Myungjin Chae, and Namhun Lee, Central Connecticut State University (USA) **B.3.3 ABC Components of the Commonwealth Avenue Superstructure Re-Placement Project,** Charles Swanson, HDR, Inc. (USA)
Sea Pearl 1&2	**Session C.3 Traffic Data Analysis** **Session Chair: Taha Ahmed, Australian University of Kuwait** **C.3.1 Driving speed analysis using real-time traffic light status information at signalized intersections,** Eunjin Choi, Hyangmi Han, Ockhee Jeon, Seungcheol Lee, and Kwangyoung Ko, Korean Road Traffic Authority (Korea) **C.3.2 Data-Driven Analysis for Road Traffic Condition Using Digital Tachograph Data**, Sung Bum Yun and Soon Yong Park, Seoul Institute of Technology (Korea) **C.3.3 A Study on Artificial Neural Network-Based Real-Time Traffic Signal Timing Design Model Utilizing Smart Intersection Data**, Sang-Tae Oh and Jin-Tae Kim, Korea National University of Transportation (Korea) **C.3.4 Deep learning and clustering-based analysis of text narratives for identification of traffic crash severity contributors,** Cristian Arteaga and JeeWoong Park, University of Nevada Las Vegas (USA)
5:00 pm – 5:30 pm	**Break (Visit Exhibition Booths)**
5:30 pm – 8:30 pm South Pacific 1&2	  **Welcoming Dinner Buffet** **Feature Presentation:** **Yongho Sohn,** Pegasus/Lockheed Martin Professor University of Central Florida **"Renaissance Engineering via Additive Manufacturing"** **"International Talent Show"**
8:30 pm – 9:00 pm South Pacific 1&2	**iSMARTi Meeting (Open to all Registered Participants)**

FRIDAY, August 18, 2023

Track A	Asphalt Pavements and Maintenance (South Pacific Suite 1)
Track B	Concrete Pavements, Bridges and Buildings (South Pacific Suite 2)
Track C	Traffic Safety, Resilience and Sustainability (Sea Pearl 1&2)
Posters	3D Laser, CFRP Dowel, AI detect Pothole, IoT QM (Exhibition Hall)

8:00 am – 8:30 am	**Registration (breakfast on your own)**	
8:30 am – 9:30 am South Pacific 1&2	**Keynote Presentations Presided by Sue McNeil, University of Delaware/University of New South Wales**	
	 **Ioannis Brilakis,** Laing O'Rourke Professor of Construction Engineering and the Director of the Construction Information Technology Laboratory at the University of Cambridge. **Presentation Title:** Digital Twinning for the Built Environment (co-presented with Tim Embley)	 **Susan Tighe,** Provost and Vice-President (Academic) and a Professor of Civil Engineering at McMaster University in Canada and a past President of the Canadian Society for Civil Engineering (CSCE). **Presentation Title:** High Performance Materials and Management Systems to Support Resilient Pavement infrastructure
9:30 am – 10:10 am South Pacific 1&2	**Invited Presentations Presided by Filippo Giustozzi, RMIT University**	
	 **Massimo Losa,** Full Professor of Road, Railway and Airport Engineering, Chief of the University Road Research Laboratory, and Vice-Director of the Department of Civil and Industrial Engineering at the University of Pisa. **Presentation Title:** The bad story and positive effects of the collapse of an iconic Italian bridge: a critical literature review	 **Jorge Pais,** Associate Professor, University of Minho, Portugal. He is co-chairman of the 10th International Conference on Maintenance and Rehabilitation of Transport Infrastructures (MAIREPAV10) in Guimarães, Portugal, July 24-26, 2024. **Presentation Title:** Pavement rehabilitation in the XXI century
10:10 am – 10:30 am	**Coffee Break (Visit Exhibition Booths)**	

10:30 am – 12:30 pm South Pacific 1	**Session A.4 Asphalt Pavement Construction QA/QC** **Session Chair: Jon Young, Hawaii Asphalt Paving Industry** **A.4.1. Unveiling the Benefits of Engineered Crumb Rubber for Asphalt Mixtures by Means of Performance-Related Characterization: Rutting Behavior,** Usman Ghani, Silvia Milazzo, Gaspare Giancontieri, Chiara Mignini, Gabriella Buttitta, University of Palermo; Fan Gu, Changsha University of Science and Technology; Davide Lo Presti, University of Palermo (Italy/China) **A.4.2 Systematic Evaluation of the Field Constructability and Performance of Asphalt Mixes Containing High Percentage Recycled Asphalt,** Logan Cantrell, Granite Construction; Haifang Wen, Washington State University (USA) **A.4.3 Application of Road Compaction Quality Control System to Road Pavement Construction for Advanced Quality Control,** Kei Sasaki, Hiroaki Aoki, Taisei Corporation; Masakazu Jomoto, Taisei Rotec Corporation; Yasuhiro Mori, Soil and Rock Engineering Corporation (Japan) **A.4.4 Real-time Field Quality Management System for Asphalt Pavement Using Cloud,** Kyu-Dong Jeong, Dong-Hyuk Kim, Jae-Won Kim, Soo-Ahn Kwon, KICT; Nam-Ho Kim, Korea University of Technology & Education; Sung-Do Hwang, KICT (Korea)
South Pacific 2	**Session B.4 Concrete Pavement Repairs** **Session Chair: Mike LaViolette, HDR., Inc.** **B.4.1 Materials and Methods for Expedient Repairs of Concrete Pavements,** Jeb S. Tingle, Charles E. Williams Jr., William D. Carruth, and Caitlin M. Tibbetts, U.S. Army Engineering Research and Development Center (USA) **B.4.2 Prediction of Blow-up Potential due to Concrete Pavement Growth**, Young Kyu Kim, Hui Rak Ahn, and Seung Woo Lee, Gangneung-Wonju National University (Korea) **B.4.3 Construction and Design guidelines for Lightweight Cellular Concrete as Pavement Subbase,** Abimbola Oyeyi, University of Waterloo; Frank Ni, University of Florida; Susan Tighe, McMaster University (Canada/USA) **B.4.4 A Data-Driven Approach for Fatigue Damage Prediction in Jointed Plain Concrete Pavement Subjected to Superloads,** Yongsung Koh, Halil Ceylan, Sunghwan Kim and In Ho Cho, Iowa State University (USA)
Sea Pearl 1&2	**Session C.4 Resilience and Sustainability** **Session Chair: S. Sonny Kim, University of Georgia** **C.4.1 Progress Toward More Resilient Infrastructures: Review of Recent Efforts,** Amir Golalipour**,** Federal Highway Administration (USA) **C.4.2 Quantifying and Reducing Uncertainty in Transportation System Resilience Assessment: A Dynamic Bayesian Network Approach,** Vishnupriya Jonnalagadda and Ji Yun Lee, Washington State University (USA) **C.4.3 Important Sustainability Determinants Meeting Sustainability Goals of California Infrastructure Construction Projects**, Joseph J. Kim and Patricia McCarthy, California State University Long Beach (USA)
12:00 pm – 12:30 pm **Exhibition Hall**	**Poster Session** - 3D Laser, CFRP Dowel, AI detect Pothole, IoT QM, NOx Removal **P.1. Damage Detection and Monitoring of a Concrete Structure Using 3D Laser Scanning**, Manik Das Adhikari, Gangneung-Wonju National University; Tae-Hwan Kim, Yongin University; Sang-Guk Yum, Gangneung-Wonju National University; Joon-Yeong Kim, SQ Engineering Co. (Korea) **P.2. Large-scale Test Setup of Concrete Pavement Slabs Jointed by Carbon Fiber-Reinforced Polymer Dowel Bars as Load Transfer Devices,** Taha Ahmed, Ahmad Saad, Abdulhadi Kazem, Australian University of Kuwait; Ali Radwan, International University of Kuwait; Ali AlMutairi, Sarah Ashkanani, Australian University of Kuwait **P.3 Investigation on the process of eliminating abnormal objects from the road for the creation of an AI program that can automatically detect potholes,** Moonsup Lee, Taehoon Lee, Younghan Park, Seungyeon Han, KICT; Nuri Lee, Chulki Kim MOLIT (Korea) **P.4 IoT(Internet of Things) Based Pavement Quality Management System Platform,** Suwan Chung, Tae-wook Kang, Byungkon Kim, KICT (Korea) **P.5 NOx Removal of Pervious Concrete Pavement Materials with TiO_2,** Cheolwoo Park, Minsoo Cho, Dong Jun Kim, Ui Dae Park Yong Sik Kwon, Minkyu Ju and Seungwon Kim, Kangwon National University (Korea)
12:30 pm – 1:30 pm	**Lunch Buffet (Visit Exhibition Booths)**

1:30 pm – 3:00 pm South Pacific 1		**Session A.5 Asphalt Pavement Design and Recycling** **Session Chair: Omar Smadi, Iowa State University** **A.5.1 Investigation of Long-Term Performance of Waste-Plastics Modified Asphalt Mixtures**, Sin-Mei Lim, Gengren Hao, National University of Singapore; Anggraini Zulfiki, Land Transport Authority of Singapore; Ghim Ping Ong, National University of Singapore (Singapore - No Paper) **A.5.2 Performance Life using Mechanistic-empirical Analysis of Asphalt Mixtures in Arid Climatic Conditions-Case of Kuwait,** Taha Ahmed, Aditya Singh, Australian University, Kuwait; Elie Hajj, University of Nevada, Reno; Ahmad Saad, Australian University, Kuwait (Kuwait/USA) **A.5.3 Establishing Density Based Mix Design for Cold Recycled Asphalt Mixes**, Mansour Solaimanian, Scott Milander, Pennsylvania State University (USA) **A.5.4 Plastic Recycling in Asphalt Concrete Pavements: Preliminary Observations from Hawaii's Pilot Project**, A. Ricardo Archilla, University of Hawaii at Manoa (USA)
South Pacific 2		**Session B.5 Soil Stabilization** **Session Chair: David Woodward, Ulster University** **B.5.1 Use of Ground Penetrating Radar to Detect Cement Content on Cement Stabilized Subgrade**, Zack Hall and S. Sonny Kim, University of Georgia (USA) **B.5.2 Machine Learning-based Slope Failure Prediction Model Considering Uncertainty of Prediction**, Junhyuk Choi, POSTECH; Yongkyu Cho, Kangnam University; Yongjin Kim, Smartgeotech; Yongseong Kim, Bongjun Ji, Kangwon National University (Korea) **B.5.3 Study of different stabilizers to dry sludge for use in confined landfill and ditches**, Rita M. Fortes, Post-Graduate at Federal Institute of São Paulo; A.S. Pinto, T.M. Gomes, Environmental Management of the Environmental Manaus; L. Rabelo, DD&L Consultores; M. Dos Reis Paulista University (Brazil) **B.5.4 Expeditionary Ground Rehabilitation for Military Vehicle Traffic,** Haley Bell, Lulu Edwards, and John Rushing, U.S. Army Engineer Research and Development Center (USA)
Sea Pearl 1&2		**Session C.5 Sustainable Pavements** **Session Chair: Halil Ceylan, Iowa State University** **C.5.1 Innovative Design of Paving Cold Mix and Cohesive Overlays for Sustainable Pavement Maintenance,** Xiang Chen, Xiaohu Wang, Road Intellitech Co.; Tao Ma, Southeast University; Susan Tighe, Li Ningyuan, McMaster University (China/Canada) **C.5.2 Life Cycle Assessment of a Sustainable and Innovative Solution for Unpaved Rural Roads,** Leonardo Urbano, Lucia Tsantilis, Pier Paolo Riviera, Orazio Baglieri, Politecnico di Torino; Ezio Santagata, Politecnico di Torino/Qatar University (Italy/Qatar) **C.5.3 Consistent Foamed Asphalt Contents Needed for Cold In-place Recycled Pavement Layers in Practice,** Hosin "David" Lee, University of Iowa; Byungkyu Moon, ARA Associates; Ashley Buss, Iowa DOT; Charles T. Jahren, Iowa State University (USA) **C.5.4 Improving fatigue and rutting resistance of road pavements by using aramid fibers,** Jorge Pais, Grigório Neto, Johnny Coelho, Paulo Pereira, University of Minho (Portugal)
3:00 pm – 3:30 pm		**Coffee Break (Visit Exhibition Booths)**

3:30 pm – 5:00 pm South Pacific 1	**Session A.6 Pavement Maintenance and Management** **Session Chair: Mansour Solaimanian, Pennsylvania State University** **A.6.1 Data-driven Approach to Decision-making for Pavement Preservation,** Sara Arezoumand, Alireza Sassani, and Omar Smadi, **Iowa State University** (USA) **A.6.2 Advancement of Pavement Management System for Efficient Management of National Highway in Korea,** Seungyeon Han, Hyungmog You, Myeongill Kim, Moonsup Lee, KICT; Nuri Lee, Chulki Kim, Ministry of Land, Infrastructure and Transport (Korea) **A.6.3 Automated Distress Detection, Classification and Measurement for Asphalt Urban Pavements Using YOLO,** Paulina Gómez-Conti and Alelí Osorio-Lird, Federico Santa María Technical University (Chile) **A.6.4 Combined Use of GPR and PMS Data for Composite Pavement Assessment,** Tae-Soo Kim, Chul-Ki Jung, Young-Mi Yoon, Byeong-Seok Kwak, and Jung-Hun Lee, Roadkorea Inc. (Korea)
South Pacific 2	**Session B.6 Rail and Autonomous Vehicles** **Session Chair: B. Brian Park, Professor of University of Virginia** **B.6.1 Is Maintaining a Train Network in New Zealand Worth the Cost?**, Eric Scheepbouwer and Daniel Van der Walt**,** University of Canterbury (New Zealand) **B.6.2 Evaluating Remediation Techniques for Fouled Ballast on Army Installations,** Charles E. Williams Jr. and Thomas J. Beasley, U.S. Army Engineering Research and Development Center (USA) **B.6.3 Implementing Public Service Features in Autonomous Vehicles in Seoul**, Hyerim Cho, SoonYong Park, Junchul Kim, and Seol Young Lee, Seoul Institute of Technology (Korea) **B.6.4 Evaluating the demand for truck-only toll lanes in Southern California freeways with both owner-operator and company truck drivers,** Jose Arroyo-Turcios and Joseph J. Kim, California State University Long Beach (USA)
Sea Pearl 1&2	**Session C.6 Traffic Safety Features** **Session Chair: Adelino Ferreira, University of Coimbra** **C.6.1 Study on Traffic Incident Management Boundary Based on GIS and Its Historical Travel Time Data,** Donghyeop Kim and Jin-Tae Kim, Korea National University of Transportation (Korea) **C.6.2 Simplified Deterioration Modeling for Highway Sign Support Systems,** Myungjin Chae, Lucas Voghell and Jiyong Choi**,** Central Connecticut State University (USA) **C.6.3 On-board evaluation of pavement wetness from water spray**, Ebrahim Riahi, Wiyao Edjeou, Manuela Gennesseaux, Sebastien Buisson, Veronique Cerezo and Minh-Tan Do, Univ Gustave Eiffel (France)
5:00 pm – 5:30 pm	**Break (Visit Exhibition Booths)**
5:30 pm – 8:00 pm South Pacific 1&2	 **Closing Dinner Buffet** **Feature Presentation:** **Krishna Prapoorna Biligiri,** Associate Professor & Head of Civil and Environmental Engineering, Indian Institute of Technology Tirupati; Chairman of Second International Conference on Smart Cities (ICSC2) in Tirupati, India, February 19-21, 2025. **"Integrating Mechanistic Roadway Designs with Lifecycle Assessment: Moving Towards Achieving Sustainability in Roadway Technology & ICSC2"** **&** **Jorge Pais Associate Professor, University of Minho, Portugal.** **"Presentation of MAIREPAV10, July 24-26, 2024"** **Presentation of iSMARTi Awards**

SATURDAY, August 19, 2023

9:30 am – 9:30 pm Hawaiian Culture Tour ($200)	**Tour of Hawaii Cultural Sites:** Meet at Hilton Hotel Tour Bus Station (lunch on your own and $140 Luau dinner provided at Paradise Cove)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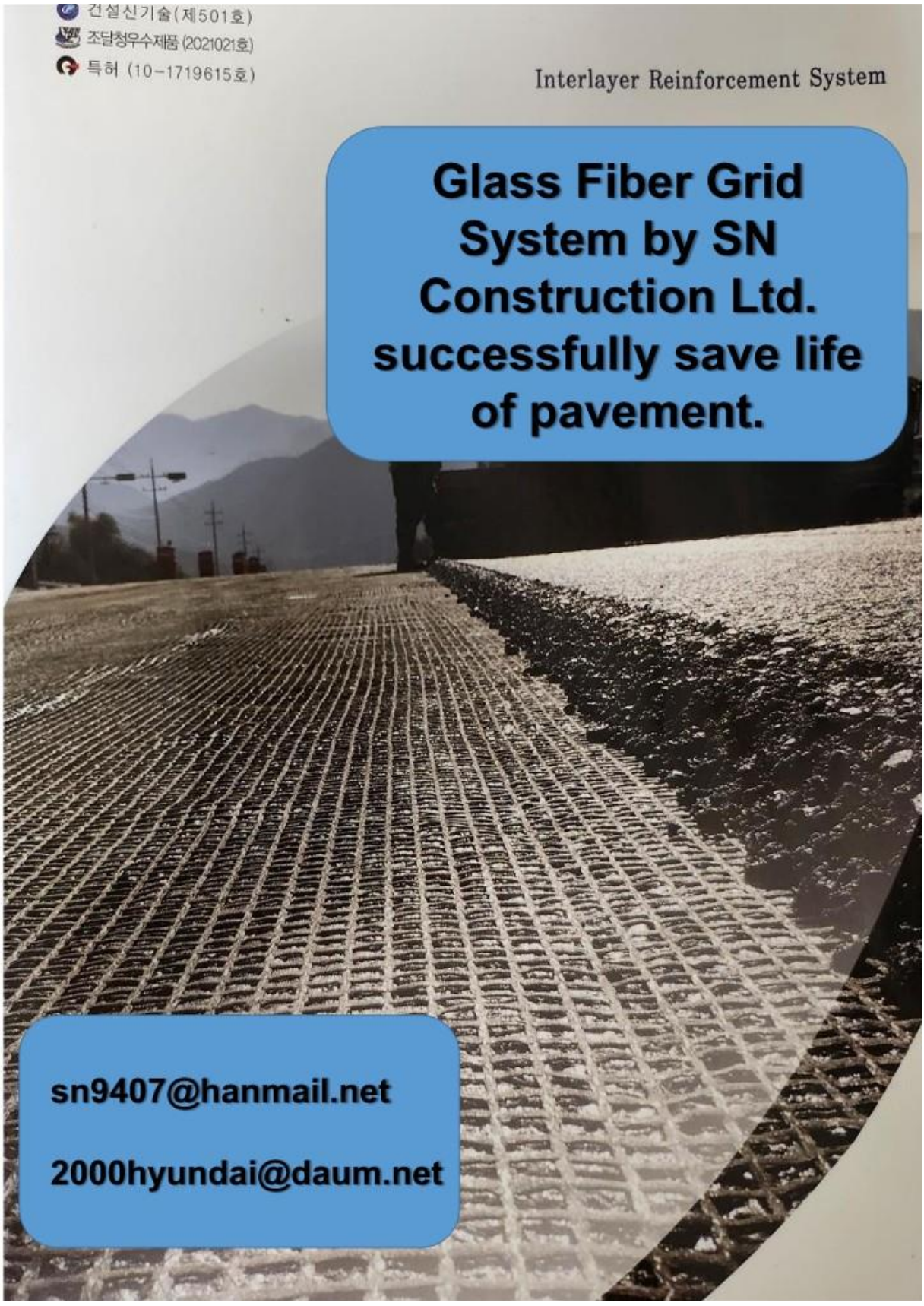
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Development of Road Pavement On-site Quality Management System using IoT Technology

VISION

Smartization of Road Pavement Construction Quality Management

Using 4th Industrial Revolution Technology

Objective

- Improve performance life of cement concrete pavement by 20%
- Improve performance life of asphalt concrete pavement by 20%
- Improve information management & decision-making efficiency of road pavement by 20%

IoT Integrated Management System

Transmission of quality information using IoT

Quality information integrated operation system

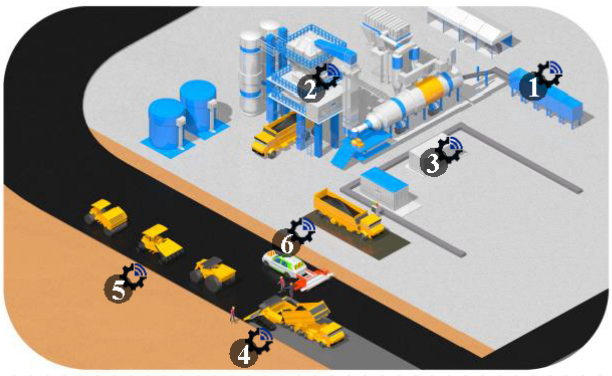
IoT-PQMS
(Pavement Quality Management System)

Quality information big data analysis

Quality Management of Cement Concrete Pavement Using IoT

1. Measure and transmit quality information of **cement concrete raw materials**
2. Measure and transmit quality information of **cement concrete mixture production**
3. Measure and transmit quality information of **on-site ready-mixed concrete**
4. Measure and transmit **paving quality** information of cement concrete pavement
5. Measure and transmit **curing quality** information of cement concrete pavement
6. Measure and transmit **joint cutting quality** information of cement concrete pavement

Quality Management of Asphalt Concrete Pavement Using IoT



1. Measure and transmit quality information of **asphalt concrete raw materials**
2. Measure and transmit quality information of **asphalt concrete mixture production**
3. Measure and transmit quality information of **asphalt concrete specimen**
4. Measure and transmit **paving quality** information of asphalt concrete pavement
5. Measure and transmit **compaction quality** information **during asphalt concrete paving**
6. Measure and transmit **compaction quality** information **after asphalt concrete paving**

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