Ministry of Housing, Utilities and Urban Communities

Housing & Building National Research Center International Conference
Future Vision & Challenges for Urban Development
"Green Smart Sustainable Building between Present & Future"
14th - 17th December 2024 - Cairo, Egypt

Housing & Building
National Research Center

- Panel Title: Role of Technology in Civil Engineering

- Abstract and objectives

This panel explores diverse, cutting-edge approaches to enhance the sustainability, resilience, and safety of urban infrastructure systems in response to climate change and urbanization challenges. Presentations cover the development of smart cities through the integration of AI, IoT, and big data for real-time infrastructure monitoring and energy optimization. Additionally, advanced probabilistic methods and innovative design techniques are highlighted to mitigate geological hazards and infrastructure deterioration, emphasizing the need for resilient masonry wall systems and enhanced bridge frameworks. The impact of technological advancements on road safety, smart infrastructure, and innovative strategies for safer transportation networks is also examined. Furthermore, the use of digital twins for urban systems leveraging AI-based modeling is presented, showcasing future directions in creating sustainable and resilient smart cities. The panel collectively underscores the critical role of technology in addressing contemporary civil engineering challenges, aiming to ensure the resilience, safety, and efficiency of infrastructure systems.

This panel aims at achieving the following objectives:

- Promote Sustainable Urban Development
- Enhance Infrastructure Resilience
- Integrate Advanced Monitoring Systems
- Improve Road Safety
- Develop Urban Digital Twins

- Outlines and biography of speakers

<u>Keynote presentation:</u> Towards Sustainable, Resilient, and Energy-Efficient Smart Cities: Building Infrastructure and Energy Systems of the Future

Presented by **Dr. Mustafa Gül**

Bio: Dr. Mustafa Gül is a Professor in the Department of Civil and Environmental Engineering at the University of Alberta (UofA). He received his BSc and MSc in Civil Engineering from Boğaziçi University in Turkey in 2002 and 2004, respectively. He then pursued doctoral studies at the University of Central Florida (UCF), obtaining his PhD in Civil Engineering in 2009 on monitoring of civil infrastructure systems. Dr. Gül has been an Assistant, Associate and Full Professor at the University of Alberta since 2011. Additionally, Dr. Gül is currently serving as the Director of Internationalization for the Faculty of Engineering. Dr. Gül's current research focuses mainly on developing novel technologies for smart, sustainable, and resilient cities and societies by developing technologies for Crowdsensing-based Monitoring of Built and Natural Environments (CoMBiNE). In addition, Dr. Gül investigates various topics, such as efficient integration of solar PV Systems into energy-efficient buildings and community-wide and city-wide solar PV applications. Dr. Gül has led more than 25+ large-scale research projects in the infrastructure and energy areas funded by various federal and provincial organizations and industry partners, and he has published 90+ journal papers and 100+ conference papers in the areas of infrastructure and energy.

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Panel presentation 1: Future Directions in Road Safety Research

Presented by **Dr. Karim El-Basyouny**

Bio: Dr. Karim El-Basyouny is a Killam Laureate Professor and holds an endowed chair position in urban traffic safety at the University of Alberta. He is a licensed Professional Engineer in the province of Alberta and holds Master's and Ph.D. degrees in Transportation Engineering from the University of British Columbia. Passionate about safety, Karim has dedicated his research and professional career to advancing our understanding of increasing safety and improving mobility for all road users. Over the past decade, his research on safety management has informed public policy and practice. He views safety as a product akin to any other good or service and advocates for a management framework that fosters a safe system. His ultimate aim is to stir discussion on crucial yet often overlooked issues to move towards a system free of death and disability. Dr. El-Basyouny actively participates in multiple national and international safety committees and serves on the editorial boards of several prestigious journals. Throughout his academic journey, he has earned several notable awards for his research and leadership contributions.

Panel presentation 2: Building the Future of Bridge Safety: Addressing Climate Impacts, Hazards, and Overloads

Presented by **Dr. Shay Abtahi**

Bio: Dr. Shay Abtahi is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Alberta, where she is the only female faculty member in the Structures group. She earned her Ph.D. in Structural Engineering from the University of Alberta in 2022 and transitioned to her current role in 2023, after a postdoctoral position at the same institution. Dr. Abtahi's expertise lies in advanced computational modeling, reliability-based code calibration, and the application of machine learning and artificial intelligence in structural engineering. Her research focuses on developing resilient and sustainable infrastructure systems, particularly in the context of natural hazards and climate change. By integrating innovative techniques such as ML-powered and AI-assisted modeling and system identification, she aims to revolutionize the field and enhance the performance and safety of transportation infrastructure. Dr. Abtahi is driven by her commitment to excellence and her deep desire to inspire the next generation of engineers, especially women and other underrepresented minorities. She enjoys working with partners to shape a future where ingenuity knows no bounds!

Panel presentation 3: AI-Powered Digital Twinning of Urban Systems in Future Smart Cities

Presented by **Dr. Nima Shirzad-Ghaleroudkhani**

Bio: Dr. Nima Shirzad-Ghaleroudkhani is an Assistant Industrial Professor fellow at the University of Alberta. He completed his Ph.D. (2022) in Structural Engineering at the University of Alberta and his M.Sc. (2016) and B.Sc. (2014) in Civil Engineering at Sharif University of Technology. During his Ph.D. studies, he focused on crowdsensing-based framework for monitoring transportation infrastructure, for which he was awarded multiple scholarships including the Alberta Innovates Graduate Student Scholarship for Data-Enabled Innovation. Currently, he is leading multiple research groups focusing on developing tools for Digital Twinning of the built and natural environments in future smart cities.