NEWS RELEASE 31-JAN-2022

Lehigh University, UCLA help ASCE curate a 'life-cycle engineering reader' in bridge asset management

Online research collection bridges a crucial gap between theory and practice for engineers across the public and private sectors

Business Announcement

LEHIGH UNIVERSITY

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KEYWORDS

BRIDGE CONSTRUCTION BRIDGES STRUCTURAL DESIGN STRUCTURAL ENGINEERING TRANSPORTATION TRANSPORTATION ENGINEERING TRAFFIC ENGINEERING CONSTRUCTION ENGINEERING

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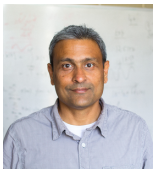

ORIGINAL SOURCE

https://engineering.lehigh.edu/news/article/lehigh-ucla-help-asce-curate-life-cycle-engineering-reader-bridge-asset-management

It's no secret that the nation's bridges are in dire straits.

IMAGE: PROFESSOR DAN M. FRANGOPOL IS FAZLUR R. KHAN ENDOWED CHAIR OF STRUCTURAL ENGINEERING AND ARCHITECTURE, AND PROFESSOR OF CIVIL ENGINEERING, AT LEHIGH UNIVERSITY view more ›

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According to the American Society of Civil Engineers (ASCE), there are more than 617,000 of them across U.S. At the moment, more than 40 percent are greater than 50 years old, and 7.5 percent are considered structurally deficient.

This means that, every day, 178 million of the car trips we take—to our favorite stores and restaurants, to places of work or worship, to soccer practices, theaters, and relatives' homes—traverse bridges that are in poor condition by any measure.

A significant portion of the $1.2 trillion federal Infrastructure Investment and Jobs Act will go toward alleviating strain on the nation's bridges—structures expected to last for decades, if not centuries. The question for public and private sector bridge engineers: How can this funding be optimized on the local and regional levels to best serve society's present needs, as well as those 10, 50, or 100 years into the future?

To help bridge engineers develop a framework for asset management and prioritization of bridge maintenance projects, ASCE recently turned to two recognized leaders in structural engineering research: Professor **Dan M. Frangopol** of Lehigh University and Professor **Sriram Narasimhan** of the University of California-Los Angeles.

Together, Frangopol and Narasimhan have curated the ASCE's "Bridge Asset Management Collection," a series of research papers selected to assist all stakeholders, including state Departments of Transportation, in asset management and prioritization of bridge maintenance projects to maximize use of this funding.

"Across the study and practice of infrastructure engineering, this injection of federal funding into surface transportation and bridges is seen as absolutely essential," says Frangopol, the Fazlur R. Khan Endowed Chair of Structural Engineering and Architecture and Professor of Civil Engineering at Lehigh University, and organizer of its Fazlur R. Khan Distinguished Lecture Series. "For the engineers across our country responsible for translating that funding into action and results, it is an incredibly important moment to consider the entire life-cycle of these assets, and to manage them accordingly."

"Much of the underlying research in the collection represents collaborative efforts with former students and postdocs who have studied with me and supported my lab over the years," he continues, "so I am doubly delighted to be able to be a part of this ASCE effort to support the practicing engineers responsible for the task of repairing and rehabilitating our nation's bridges."

The collection, available via the ASCE website, contains research published in ASCE research journals and books chapter as follows:

- Network-level Risk-based Framework for Optimal Bridge Adaptation Management Considering Scour and Climate Change
  Journal of Infrastructure Systems
- Bridge Load Testing: State-of-the-Practice
  Journal of Bridge Engineering

- Integrating the Risk of Climate Change into Transportation Asset Management to Support Bridge Network-Level Decision-Making
  Journal of Infrastructure Systems
- Determining Target Reliability Index of Structures based on Cost Optimization and Acceptance Criteria for Fatality
  ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering
- A Decision-Making Framework for Load Rating Planning of Aging Bridges Using Deep Reinforcement Learning
  Journal of Computing in Civil Engineering
- Investigation of the Effects of Time Preference and Risk Perception on Life-cycle Management of Civil Infrastructure
  ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering
- Condition-Based Multiobjective Maintenance Decision Making for Highway Bridges Considering Risk Perceptions
  Journal of Structural Engineering
- I-78 Bridge over Schuylkill River, Industrial Drive, and RBMN Railroad, Hamburg, PA: Bridge Replacement vs. Rehabilitation of Approach Spans
  Structures Congress 2020
- Life-Cycle Performance of Infrastructure Networks
  Chapter 3 from Life-Cycle Design, Assessment, and Maintenance of Structures and Infrastructure Systems

About Professor Dan M. Frangopol

Prof. Dan M. Frangopol is the inaugural holder of the Fazlur R. Khan Endowed Chair of Structural Engineering and Architecture at Lehigh University. He is widely recognized as a leading educator and pioneer in the field of life-cycle engineering. His main research interests are in the development and application of probabilistic concepts and methods to civil and marine engineering, including: structural reliability and probabilistic mechanics; life-cycle cost analysis; probability-based assessment, design, and multi-criteria life-cycle optimization of structures and infrastructure systems; structural health monitoring; life-cycle performance maintenance and management of structures and distributed infrastructure under extreme events (earthquakes, tsunamis, hurricanes, and floods); risk-based assessment and decision making; multi-hazard risk mitigation; infrastructure sustainability and resilience to disasters; climate change adaptation.

Prof. Frangopol is the Founding President of the International Association for Bridge Maintenance and Safety (IABMAS) and of the International Association for Life-Cycle Civil Engineering (IALCCE), Founding Vice-President of the International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII), and Founder and Editor-in-Chief of *Structure and Infrastructure Engineering* an international peer-reviewed journal launched in 2005. He is the Past Vice-President of the International Association for Structural Safety and Reliability (IASSAR), and Past Vice-President of the Engineering Mechanics Institute (EMI) of ASCE and Past Member of its Board of Governors. He is also the Founder and Inaugural Chair of the ASCE-SEI Technical Council on life-cycle performance, safety, reliability and risk of structural systems, and of the IASSAR Technical Committee on life-cycle performance, cost and optimization. He has held numerous leadership positions in national and international professional societies including Chair of the Technical Activities Division of the Structural Engineering Institute (SEI) of ASCE, Chair of Executive Board of IASSAR, Chair of IABSE Working Commission 1 on Structural Performance, Safety and Analysis, and Chair of IFIP WG 7.5 on Reliability and Optimization of Structural Systems. He is an inaugural Fellow of SEI and EMI, a Fellow of ACI, IABSE, and ISHMII, a Distinguished Member of ASCE, a Member of the National Academy of Construction of the United States, a Foreign Member of Academia Europaea and of the Royal Academy of Belgium for Science and the Arts, a Foreign Associate of the Engineering Academy of Japan, and an Honorary Member of both the Romanian Academy and the Romanian Academy of Technical Sciences. For more about Professor Frangopol, please visit https://www.lehigh.edu/~dmf206.

About Professor Sriram Narasimhan

Dr. Sriram Narasimhan is a professor in the departments of Civil and Environmental Engineering & Mechanical and Aerospace Engineering at the University of California, Los Angeles. His research areas include autonomous systems for civil engineering applications and condition assessment of civil and mechanical systems. He received his PhD in 2005 from Rice University in Civil Engineering. Subsequently, he joined the University of Waterloo in 2006 as an Assistant Professor, where he was promoted to the rank of Associate Professor in 2012 and full Professor in 2018. He joined UCLA's Samueli School of Engineering in March 2021.

Dr. Narasimhan is active in various international technical committees and is currently the Editor-in-Chief of the ASCE Journal of Bridge Engineering. Previously, he served as an Associate Editor in the ASCE Journals of Structural Engineering and Bridge Engineering. He serves on the editorial board of the Journal of Structural Control and Health Monitoring. Dr. Narasimhan is a reviewer for several international scientific journals and has served on various funding agency panels and committees in the USA and Canada. He is a registered professional engineer in the province of Ontario in Canada. For more about Professor Narasimhan, please visit https://samueli.ucla.edu/people/sriram-narasimhan.

RELATED LINKS:

- *ASCE Library*: Bridge Asset Management Collection
- Faculty Profile: Dan M. Frangopol
- Personal Web site: Dan M. Frangopol
- Sriram Narasimhan, Samueli School of Engineering, UCLA
- Fazlur Rahman Khan Distinguished Lecture Series, Lehigh University