RESiST

Regional Infrastructure Seismic Resilience Enhancement through a Spatial-Temporal Data-Driven Approach

OVERARCHING PROGRAMME

e-ASIA Joint Research Program

RESIST SEMINAR SERIES — NO. 02 · HYBRID (IN-PERSON + ONLINE)

Japan–Korea–China SHM Symposium

KEYNOTE

Computer Vision Applications in Structural Health Monitoring

Digitalization, Tracking, and State Inference

Computer vision offers new opportunities in structural health monitoring by enabling non-contact measurement of geometry, motion, and deformation in existing structures. This talk presents recent research efforts on vision-assisted SHM, organized around three topics: structural digitalization, 6-DoF tracking, and internal state inference. First, a computer vision–enabled digital twin framework is introduced to generate analysis-ready structural models from field-acquired visual data. The approach addresses occlusion and incomplete point-cloud reconstruction by integrating scan-derived geometry with design information and structural priors, enabling finite element–ready digital twins for maintenance applications. Second, a structure-referenced 6-DoF camera pose estimation method is presented for target-free UAV-based bridge displacement monitoring. By using bridge components as visual references and combining pose estimation with temporal tracking, the method aims to reduce camera ego-motion effects and improve dynamic displacement measurement. Third, a vision-based inverse state inference framework is discussed, where full-field deformation measurements are coupled with physics-informed model updating to estimate hidden structural properties such as material parameters and reinforcement details. Together, these studies show how computer vision can complement conventional SHM methods by connecting field observations with structural models. The talk highlights both the potential and practical challenges of using visual data for digital twin generation, dynamic response monitoring, model updating, and data-driven structural assessment.

KEYNOTE SPEAKER

Robin Eunju Kim

Associate Professor, Ph.D.

Dept. of Architecture and Architectural Engineering · Seoul National University

Dr. Robin E. Kim is an Associate Professor in the Department of Architecture and Architectural Engineering at Seoul National University. She received her Ph.D. from the University of Illinois Urbana-Champaign in 2015. Before joining Seoul National University, she served as an Assistant Professor in the Department of Civil and Environmental Engineering at Hanyang University. Her research focuses on smart sensing and AI-based structural monitoring to improve urban sustainability and safety, with interests in non-contact sensing, digital twins, synthetic data generation, and machine learning–based integrity forecasting.

DATE & TIME

Thursday, 30 July 2026

JST 9:30 **AM** Japan
WIB 7:30 **AM** Indonesia
CST 8:30 **AM** China
SGT 8:30 **AM** Singapore

IN PERSON

The University of Tokyo, Bldg. 11 · 1F, HASEKO-KUMA HALL

ONLINE

Zoom Webinar register: https://forms.gle/KB7Ek6KVorJJaeTC9

PARTICIPATING INSTITUTIONS

筑波大学 University of Tsukuba · 香川大学 · 東京大学 · ZHEJIANG UNIVERSITY · NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

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CONTRIBUTED TALKS

CHAIR Prof. Pang-jo Chun · The University of Tokyo

TALK 01 — 15 MINUTES

Flight-path optimization of UAV bridge inspection based on structural reliability

Mayuko Nishio

Associate Professor, University of Tsukuba

TALK 02 — 15 MINUTES

Disaster risk and resilience assessment of regional-scale road networks

Shiori Kubo

Lecturer, Kagawa University

TALK 03 — 15 MINUTES

Vibration-based structural health monitoring for Bridges: From deterministic damage indicators to uncertainty-aware detection

Zhao Lei

Postdoctoral Researcher, The University of Tokyo

TALK 04 — 15 MINUTES

BI-Agent: VLM-Based Embodied Decision Making for Navigation and Question Answering in Bridge Inspection

Yasutaka Narazaki

Assistant Professor, Zhejiang University

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