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2025

Saitama University

Newsletter

International Graduate Program on Civil & Environmental Engineering

Engineering the Future: AI-Driven Advances in Japan's Infrastructure

Japan is steadily embracing the use of Artificial Intelligence (AI) as a key part of its Society 5.0 vision to tackle aging infrastructure and a shrinking workforce. AI can provide solutions for public safety, operational efficiency, and infrastructure resilience. This is especially important considering that approximately 17% of bridges managed by local governments—around 10,000 structures—have been overdue for repairs for at least five years. Nearly 40% of all known bridges are over 50 years old, according to reports by the Asahi Shimbun published in December, 2024. AI's capabilities in predictive analysis and automated monitoring are considered vital to meeting the growing demand for maintenance.

The Japanese government is actively integrating AI into infrastructure management through several key initiatives. Key initiatives include the Cross-Ministerial Strategic Innovation Promotion Program (SIP)'s 'Smart Infrastructure Management System,' leveraging AI for innovative construction, enhanced maintenance, and smart data platforms. In parallel, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) further champions projects like PLATEAU, creating 3D digital city models as crucial data foundations for AI-driven planning and management. Collaborations, such as the Public Works Research Institute's (PWRI) work with MLIT using AI and advanced scanning for early damage detection, underscore these government-backed efforts to foster a proactive, data-driven approach, enhancing national resilience and disaster preparedness.

Private sector innovation is central to the practical application of AI in infrastructure management. Companies are developing advanced AI solutions for predictive maintenance, using image analysis to anticipate corrosion and optimize repair schedules. AI-powered drone inspections are also being deployed to precisely assess damage, like corrosion depth on bridge steel, reducing manual assessments. Furthermore, image-based AI services are emerging to accurately detect defects in various infrastructure, including expressways, bridges, and tunnels, complementing skilled inspection engineers.

At Saitama University's Department of Civil and Environmental Engineering, various research projects are employing AI for infrastructure monitoring and management. Among these, Assoc. Prof. Ji Dang leads research on 'human-in-the-loop' (HITL) AI, in which human feedback helps improve AI models beyond learning from limited examples. This HITL approach allows users to fine-tune AI models collaboratively, improving accuracy over time. For example, when an AI analysing UAV bridge images misclassifies background as damage or overlooks unfamiliar decay, a human expert can correct it, refining the model's training. By using a few examples labelled by humans along with many unlabelled ones, the AI quickly learns to avoid past mistakes. This makes HITL AI a more reliable and efficient partner for infrastructure inspection. An example is shown in Figure 1.

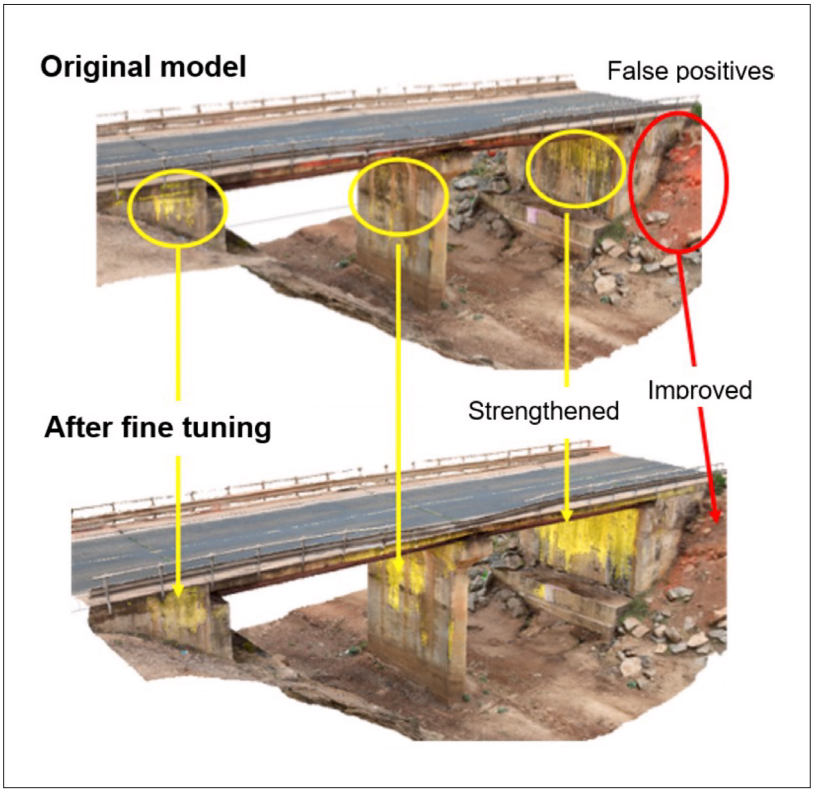


Figure 1: AI bridge inspection: Original (top) and fine-tuned (bottom) models show improved accuracy via human-in-the-loop AI. (Courtesy: Structural Engineering, Mechanics and Materials Group)

Together, these AI efforts are transforming how Japan protects vital infrastructure, building a safer, sustainable future. Using AI for maintenance, failure prediction, and urban services strengthens national resilience and disaster response. This proactive approach supports the long-term well-being of Japan's infrastructure and its economy. As these trends continue, AI-focused infrastructure research will grow, driving innovations for a more resilient Japan.

Greetings from the Head of the Foreign Student Office

I am delighted to welcome you to the latest edition of our newsletter. As an international hub for advanced civil and environmental engineering education and research, our program continues to thrive through the diversity, innovation, and dedication of our students, faculty, and global partners.

We take pride in the diverse and vibrant community that forms the heart of our program. With students and researchers from many countries and cultures, our program is more than just a place for advanced technical knowledge and skills—it is a place where ideas, perspectives, and friendships cross borders.

In the current world, where global cooperation and mutual understanding are more important than ever, we believe that education plays a vital role not only in developing professional skills but also in fostering peace. Through daily interactions, collaborative research, and shared experiences, we hope that each member of our community gains a deeper appreciation of different cultures and ways of thinking.

It is my sincere wish that the knowledge and friendships built here in our program will extend beyond the classroom and contribute, in small but meaningful ways, to greater understanding among individuals—and ultimately, to peace in the world.

Thank you for being a part of our community. We look forward to your continued involvement and support.

With best regards,

Yasunao Matsumoto
Head of the Foreign Student Office
International Graduate Program on Civil and Environmental Engineering, Saitama University

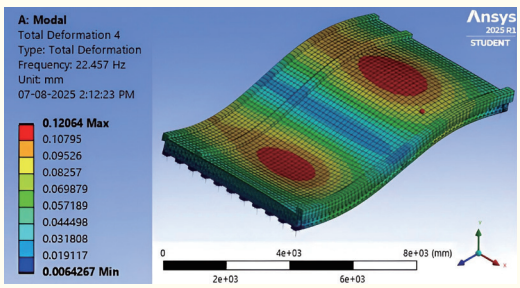
Research Profile Series (25)
The Structural Mechanics and Dynamics Group (SMDG)

The Structural Mechanics and Dynamics Group (SMDG) is an academic and research group within the Department of Civil and Environmental Engineering at Saitama University. Led by a team of distinguished faculty members: Professors Yoshiaki Okui, Yasunao Matsumoto, and Associate Professor Ji Dang. The group advances innovation through cutting-edge research in structural mechanics, dynamics, and artificial intelligence to improve the design, monitoring, and maintenance of bridges, buildings, and infrastructure, including human response to noise and vibration. SMDG brings together doctoral, master's, and undergraduate researchers engaged in pioneering projects. In addition to its academic work, SMDG builds strong international partnerships with other universities to advance research and innovation in civil and environmental engineering.

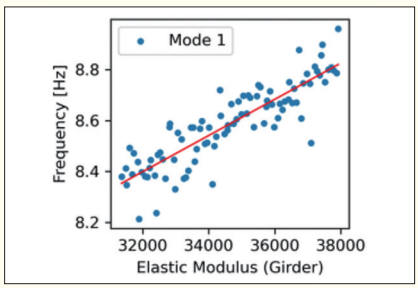
Vibration measurement at the bridge site

Ongoing research includes the accounting of various initial imperfections in structural members to enhance design practices, and the development of repair and reinforcement methods for steel components using CFRP (Carbon Fiber Reinforced Polymer) moldings. In the field of structural health monitoring, the lab is working on research related to vibration-based techniques for bridges, with current work focused on estimating modal characteristics using physics-informed machine learning approaches and the impact of environmental factors on modal characteristics, and their role in damage detection. The research group is also pursuing the widespread implementation of deep machine learning techniques for 3D modeling and structural damage detection. Experimental work includes the study of silicone-based bearing pads and their behavior under various conditions. Furthermore, the lab is conducting experimental studies on the effects of traffic-induced vibrations and noise on psychological responses, with comparative analysis across different demographic groups. These multidisciplinary efforts aim to bridge the gap between advanced computational methods, experimental validation, and human-centric infrastructure design.

Among the various research areas mentioned above, my work categories in domain of vibration-based techniques for bridges. The research focuses on vibration-based structural health monitoring of a single-span prestressed concrete girder bridge, considering the effect of environment and damages. Vibration, temperature and relative humidity measurements were collected over two periods to monitor dynamic characteristics under real-world conditions. A Gaussian Process Regression (GPR) model was used to relate natural frequencies to environmental variables. Additionally, GPR based surrogate models were developed using finite element analysis, with input parameters including concrete elastic modulus and bearing pad stiffness linked to temperature, humidity, and damage conditions to predict the natural frequencies. Different damage scenarios were considered in this research. The models were trained to predict the frequency fluctuations in both undamaged and damaged states. Damage index was developed to detect the damages under environmental variations, demonstrating the potential of approach for practical bridge monitoring under varying environmental conditions.



Example of the mode shape of the bridge



Relationship between concrete elastic modulus and natural frequency

PhD Student, Haseeb Ahmad
Pakistan

Graduation Time Congratulations

(Name-Country-Title-Supervisor)

March 2024

(Ph. D degree)

Mr. VIDIT SINGH (India) "Assessing geotechnical properties of synthetic municipal solid waste through compositional analysis and lateral pressure evaluations" | Prof. T. Uchimura

(Master's degree)

Ms. MEDORI JAHAN (Bangladesh) "Experimental study on the flow characteristics around a laterally uniform turf patches of a finite logitudinally lengths with gaps on a levee slope" | Prof. N. Tanaka

Ms. CHOMLUCX CHONNANOBBHARRAT (Thailand) "Regression analysis of concrete shrinkage in Thailand toward improvement of practical prediction using machine learning" | Assoc. Prof. S. Asamoto

Mr. MUHAMMAD SAIF ULLAH NASIR (Pakistan) "Experimental study on headcut migration rate and scour assessment under different hydraulic conditions" | Assoc. Prof. J. Yagisawa

Mr. MD RAIHANUL KABIR (Bangladesh)"To investigate the efficiency of continuous & spaced multi-helix screw pile in the bearing layer" | Prof. T. Uchimura

Mr. MUHAMMAD MONIRUL ISLAM (Bangladesh)"Erosion control of river dike against overtopping flow" | Prof. J. Kuwano

Mr. SALAH UDDIN (Pakistan) "Effective utilization of coal ash for improving mechanical properties of muddy soil (Case in Vietnam)" | Assist. Prof. K. Nakamura

Mr. JAMSHID SAMADI (Afghanistan)"Experimental study on hysteresis performance of shear panel dampers (SPDs) made of iron-based shape memory alloys (Fe-SMAs)" | Assoc. Prof. J. Dang

Mr. FAZALHAQ PAINDA (Afghanistan) "Experimental study in controlling suspended load deposition on a floodplain under different vegetation cover by sloping a large eddy generation zone near the interface" | Prof. N. Tanaka

Mr. NOORULLAH NEKSEYER (Afghanistan) "Evaluation of bus travel time reduction by PTPS application using traffic flow simulation" | Prof. H. Kubota

September 2024

(Ph. D degree)

Mr. SANJEEV BHATTA (Nepal) "Rapid post-earthquake damage classification of regional buildings using machine learning" | Assoc. Prof. J. Dang

Mr. PHAM VAN NAM (Vietnam)"Mass transport parameters of recycled concrete aggregates blended with autoclaved aerated concrete grains for roadbed materials in Vietnam" | Prof. K. Kawamoto

Mr. NGO TRUNG PHUONG (Vietnam) "Influence of urban structure and motorcycle dependence on travel mode choice in Hanoi, Vietnam" | Assoc. Prof. A. Kojima

Mr. ZAFAR AVZALSHOEV (Tajikistan) "Mechanism of quasi-saturation based on relation with pore water and air pressure and its effect on slope stability" | Prof. T. Uchimura

Mr. SOHAIL IQBAL (Pakistan) "Experimental and numerical study of flow characteristics and scour patterns around hybrid dikes: Integrated with diverse pile designs and configurations" | Prof. N. Tanaka

Mr. NUWAN SANJEEWA HAKMANA VIDANA ARACHCHIGE (Sri Lanka) "Assessment of the structural behavior of prestressed concrete beams based on degraded mechanical properties of concrete with internal swelling reaction under steel confinement" | Assoc. Prof. S. Asamoto

Mr. NGUYEN THANH TUNG (Vietnam) "Subjective responses to traffic-induced vibration and noise in buildings: influence of cultural differences" | Prof. Y. Matsumoto

Ms. ZHANG AIJIA (China) "Structural seismic damage detection of high-rise buildings by wave propagation and deep learning" | Assoc. Prof. J. Dang

(Master's degree)

Ms. AARATI BARAL GAUTAM (Nepal)"The effect of shape and arrangement of collars and splitters on their individual or combined application against the local scour around bridge pier" | Prof. T. Uchimura

Ms. LAMA HAJMOUSA (Syria) "Post earthquake assessment using machine learning for RC building using outdoor and indoor images" | Assoc. Prof. J. Dang

Mr. SUBODH GURAGAIN (Nepal)"An experimental investigation on the effectiveness of sacrificial piles as a countermeasure against local scour at a bridge pier in the presence and absence of U-type debris accumulation" | Prof. N. Tanaka

Mr. DEEPAK NEGI (Nepal) "Predicting the effect of bed material size and geogrids on local scour around bridge pier in clear-water flow conditions" | Prof. T. Uchimura

Ms. PHAN THI NHAN TAM (Vietnam) "Analyze and evaluate factors attracting private investment for metro lines in Ho Chi Minh City, Viet Nam." | Assoc. Prof. A. Kojima

Ms. KARMA CHEKI (Bhutan) "Portable and integrating bridge inspection and maintenance system" | Assoc. Prof. J. Dang

Mr. WEERAHANNADIGE SACHINTHA GAYAN FERNANDO (Sri Lanka) "Advance statistical study on slope failure using sandpile experiment" | Assoc. Prof. Y. Togashi

News

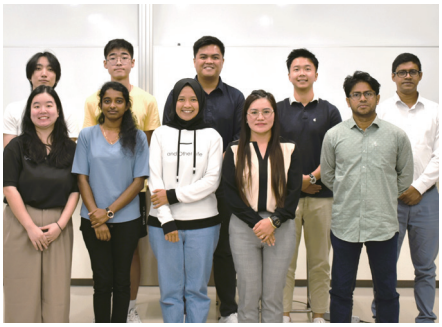
New Appointments

Dr. Masahiko Kikuchi was appointed as a Professor of Transportation and Planning Group on April 1, 2025.

Dr. Haruka Tomobe was appointed as an Assistant Professor of Geotechnical and Geosphere Research Group on April 1, 2025.

Promotion

Assistant Prof. Yota Togashi was promoted as an Associate Professor on October 1, 2024.



2024 New Students (October intakes)

2025 New Students (April intake)

Alumni Information

Dr. Mohammad Shariful Islam, a 2002 Ph.D. graduate of Saitama University, has been appointed Director of the Research and Innovation Centre for Science and Engineering (RISE) at Bangladesh University of Engineering and Technology (BUET). RISE serves as BUET's hub for promoting cutting-edge research, fostering innovation, and facilitating collaborations with government and industry to address national priorities. It also supports faculty initiatives, manages research funding, and ensures compliance.

Over the years, Dr. Islam has received more than two dozen awards for his research and academic excellence. His most recent international honors include the Dr. M Innas Ali Memorial Gold Medal from the Bangladesh Academy of Sciences in 2023, and both the Global Vetiver Champion Award and The Vetiver Network International Award from The Vetiver Network International (USA) in 2023.

Prof. Monzur Alam Imteaz, a 1997 doctoral graduate of Saitama University, promoted to the Professor level since January 2024 within the Department of Civil and Construction Engineering at Swinburne University of Technology, Melbourne, Australia. He has been teaching in the same university since 2007.

Dr. Adnan Anwar Malik, a 2015 doctoral graduate of Saitama University, was promoted to the Head of the STEM program offered at the University of Newcastle, Australia's Singapore campus. He was also promoted to a Senior Lecture of the Newcastle Australia Institute of Higher Education, Singapore, in January 2025.

Prof. Wael Zatar, a 1999 doctoral graduate of Saitama University, was honored with the 2025 Precast/Prestressed Concrete Institute (PCI) Distinguished Educator Award at the 2025 PCI Convention in Indianapolis, Indiana, USA, in February 2025. This prestigious award recognizes Prof. Zatar's outstanding contributions to advancing PCI's educational

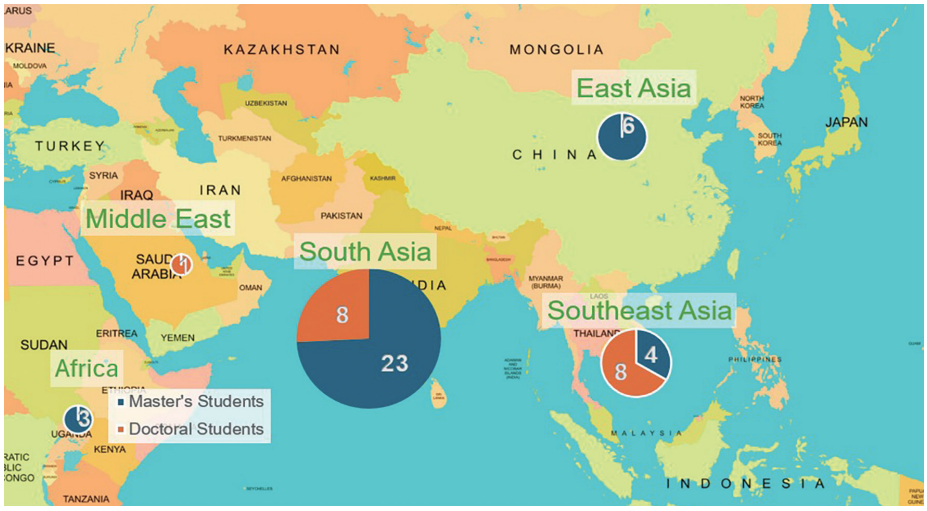
mission, his unwavering dedication to his students, and his continuous support for fellow educators.

Prof G.H.M.J Subashi, a 2005 doctoral graduate, has been awarded the "Merit Award for Scientific Publication in 2019" by the National Research Council (NRC) of Sri Lanka. The award recognizes outstanding scientific publications and was given for work published in 2019, with the ceremony held in 2023.

She has also been honored with the 'Tier 4 Star Award for Research Excellence' at the Academic Sessions and Vice Chancellor's Awards, University of Ruhuna, held on 4th June 2025. This prestigious award is granted only once in an academic's career.

Awards

Ms. Nguyen Thi Cuc, a 2025 master's program graduate, was honored with the Tokita Yasuo Research Encouragement Award 2024 by the Institute of Noise Control Engineering of Japan (INCE-Japan). The award recognizes her outstanding paper titled "An Experimental Investigation on the Effect of Duration of Living in Japan on Vietnamese Subjective Responses to Vibration and Noise." The award was presented during the INCE-Japan Conference 2024.



The number of incoming students from Oct 2023 to April 2025

Message from Alumni

It is an honour to share my experiences as an alumnus of the International Graduate Program in the Department of Civil and Environmental Engineering at Saitama University, supported by the ADB-JSP scholarship program. I earned my Master's degree from Saitama University in 2010 and was part of the Foundation and Earthquake Engineering Laboratory under Associate Professor Hidenori Mogi Sensei.

My academic journey was deeply enriching, with a strong research focus that broadened my knowledge. The guidance of my Sensei was truly remarkable. Even as I write this, I can almost smell the coffee he would prepare during our meetings, accompanied by his positive and energetic presence. Throughout my studies, I also had the opportunity to immerse myself in Japanese culture. Learning the Japanese language played a crucial role in helping me engage with the community and understand the country's traditions. The combination of academic rigor and cultural exposure contributed immensely to both my personal and professional growth.

Enrolling in the program also gave me the chance to build lifelong friendships with international peers, and we remain connected to this day. Our Sensei frequently visits my home country for various purposes, and during these trips, he always makes time to reconnect with us alumni.

I would also like to extend my heartfelt gratitude to the Foreign Student Office (FSO) for their steadfast support throughout my time in Japan. Their assistance created a welcoming and supportive environment that made a meaningful impact on my journey as an international student.

If you're studying or planning to study in the International Graduate Program, best wishes and don't forget to make most of it. Beyond academics, dive into Japan's vibrant culture, pick up some Japanese language, and connect with people from all backgrounds and embrace the academic journey at Saitama University.

Er. Sagar Prasad Mulmi

Managing Director/ Structural Engineer
CARD Consult (P) Ltd.

Message from the Foreign Student Office

It is our pleasure to reach out to you from the Foreign Student Office. We hope you are doing well.
We are happy to issue Newsletter No. 28 in the summer, continuing from the previous release.
This April, we welcomed 16 students from 7 countries, following 12 students from 9 countries in September 2024. Each semester, we enjoy introductory presentations about themselves and their home countries by new students at the FSO gathering, one of the most attractive events for both students and staff. All of us can get to know each other and experience a multinational atmosphere.
I would like to introduce to you an international event in Japan: Expo 2025, currently being held in Osaka, Running for 184 days from April 13 to October 13, 2025, this event features 158 participating countries and regions and 162 pavilions. You can easily get there by taking a Shinkansen bullet train from Tokyo to Osaka and immerse yourself in a glimpse of future society. A key highlight is smart mobility, with large-scale demonstrations of electric buses incorporating new technologies like Level 4 automated driving and in-transit power supply.
If you have an opportunity to visit Japan, we hope you to experience its rich culture, cuisine, and tradition. Japan is a country rich in nature. One of the best recommendations is cherry blossoms in spring. Especially those reflecting in a sunny blue sky, with combination of field mustard is awesome. You can enjoy that breathtaking scene near our campus!
Please do drop by our office. We always look forward to hearing from you!
Stay in touch!

The Foreign Student Office (FSO)

Department of Civil and Environmental Engineering, Saitama University
255 Shimo-Okubo, Sakura-ku, Saitama-shi, Saitama, Japan 338-8570
Phone / Fax: +81-48-858-3555
Email: fso@sun.civil.saitama-u.ac.jp
Web: http://intl.civil.saitama-u.ac.jp
Facebook: https://www.facebook.com/SUnivFSO

Editorial Board for this issue

Chief Editor : Prof. Y. Matsumoto
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