

Date: 09/25/2024

**JSPS US AND CANADA ALUMNI ASSOCIATION SEMINAR PROGRAM
REPORT**

Organizer (Awardee)

Name: ZhiQiang Chen

Position & Affiliation: Professor of Civil Engineering, University of Missouri – Kansas City

1. TITLE OF SEMINAR JSPS-UMKC Workshop: Convergence of Physical and Digital Transportation Infrastructure: Research Progress and Challenges
2. DATE(S) September 13, 2024
3. VENUE & CITY, STATE Toyota Room (FH 531), Flarsheim Hall University of Missouri - Kansas City, Volker Campus, 5000 Holmes St., Kansas City, MO 64110
4. TARGETED RESEARCH AREAS (1) Transportation Infrastructure (2) System Resilience (3) Digital Technologies and AI
5. NUMBERS OF PARTICIPANTS TOTAL: <u>30</u> persons including <u>two</u> US and Canada Alumni Association members * Including 22 in persons including nine speakers, 13 students, post-doctoral scholars, and faculty members, and 8 online participants. -US: <u>30</u> persons -CANADA: <u>0</u> persons -FROM OTHER COUNTRIES: <u>one</u> person(s) including <u>one</u> person(s) from Japan.

NOTES FOR REPORT

*Please be sure to include the following contents. (Maximum 5 pages)

1. Executive Summary

The JSPS-UMKC Workshop, held on September 13, 2024, focused on the convergence of physical and digital transportation infrastructure. Sponsored by the Japan Society for the Promotion of Science (JSPS) and supported by the University of Missouri System and related research centers, the event aimed to explore the integration of modern digital technologies in traditional infrastructure systems. The workshop provided a platform for researchers, engineers, and experts to discuss advancements, challenges, and future collaborative opportunities. The key outcomes of the workshop included the identification of collaboration initiatives between the US and Japan, the promotion of sustainable and efficient transportation systems, and the development of a dedicated website for documentation and future reference.

2. Topics Discussed from Different Speakers

The workshop was divided into Morning Session and Afternoon Session; between the two Sessions, we conducted a quick tour to the [Innovation Studio](#).

- Welcome Address:
 - Since Prof. Kevin Truman, Dean of the School of Science and Engineering at UMKC, had a conflict in the morning. Professor Jejung Lee opened the workshop with a brief welcome address, setting the tone for the day's discussions.



- JSPS Information Session:
- JSPS representatives (Ms. Yuki Tagawa, Ms. Sayaka Tominaga, and Dr. Junji Urakawa,) introduced various programs and opportunities available through JSPS, including the Visiting Professorship and Post-doctoral programs. The audience was intensively engaged with many questions about the details of the program including (1) how to make the contact with researchers in Japan; (2) The types and



durations of different visiting scholarships; and (3) bi-lateral programs between JSPS and NSF.

- Dr. ZhiQiang Chen shared his personal experience with the program, emphasizing its value for fostering international research collaboration. He personally felt that international collaboration provides a more ‘comfortable’ sentiment bearing no or little funding or publication pressure; ‘out-of-box’ creative ideas and activities may be spun out easily than other ways of collaboration. He used the example and experience that he collaborated with Dr. Dang, Ji at Saitama University. With long-term efforts without strictly following an agenda, they have coauthored a book, multiple technical papers, organized multiple conference sessions, and co-chaired an international committee. They shared curiosity in quantum computing and may pursue innovative R&D in the next phase of their careers.
- Keynote Presentations:
 - Advanced Structural Maintenance and Resilience by Digital Transformation by Professor Dang Ji from Saitama University, Japan. The talk highlighted the role of digital technologies, including digital imaging, use of unmanned aerial vehicles (UAVs), and artificial intelligence (AI), in enhancing the structural resilience and maintenance of infrastructure.
 - Secure Connected Autonomous Vehicles for Safety in Smart Transportation Systems by Professor Sanjay Madria from Missouri University of Science and Technology. Professor Madria was a JSPS fellow, a well-established expert in cyber-physical systems and vehicle automation. The presentation

covered the integration of autonomous vehicles in smart transportation and the importance of security in connected systems.

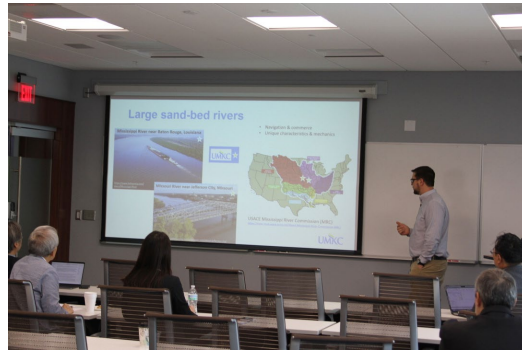
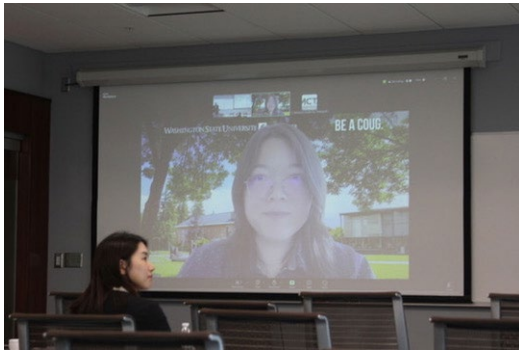
- Development and Implementation of Lower Carbon Sustainable Concrete for Infrastructure Application by Professor John Myers, Missouri University of Science and Technology. This talk focused on innovative approaches to reducing the carbon footprint in concrete manufacturing and usage.
- Overview of ERTC3 Research Activities and Findings by Professor Ceki Halmen, UMKC. An overview of research related to environmentally responsible transportation solutions and the impact on communities.



After the lunch, the JSPS delegates, Dr. Dang, and Dr. Chen have a guided tour to the UMKC Innovation Studio. The guests experienced the first-hand advanced equipment the VR/AR studio and the 3D printing studio.

- Technical Talks:

- Understanding Environmental Impact of Transportation Systems Through Causal AI by Professor Xinghui Zhao, Washington State University. This presentation discussed using AI to model and mitigate environmental impacts.
- Advances in Riverbed Roughness Quantification in Large Sand-bed Rivers by Professor Micah Wyssmann, UMKC. The talk covered methods for better flood predictions and navigational improvements.
- Advanced Bridge Design Review and Case Studies by Professor Thiagarajan Ganesh, UMKC. Practical insights into bridge design improvements and real-world case studies were presented.
- Smart Air Quality Monitoring in Urban Space by Professor Md Yusuf Uddin, UMKC. An innovative approach to real-time air quality monitoring in urban areas was discussed.



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- Dean, Professor Kevin Tuman met with the JSPS delegates, Dr. Dang Ji, and Dr. Chen. The group discussed specific areas of collaboration between JSPS, UMKC, Saitama University
 - Closing Remarks: Dr. ZhiQiang Chen concluded the workshop by summarizing the discussions, highlighting key takeaways, and setting the direction for future collaborations. The group had the group pictures.



3. Outcomes

Website Development:

A dedicated workshop website, <https://info.umkc.edu/jsp-umkc/>, is developed to archive the results, presentations, and information about the JSPS program, serving as a resource for future reference and collaboration. Dr. ZhiQiang Chen will maintain the website with the support from UMKC ITS (which is free of charge and can be online for up to three to five years).

Networking and Knowledge Exchange:

The event facilitated meaningful exchanges between experts and researchers from diverse fields, promoting interdisciplinary approaches to solving complex infrastructure challenges. The workshop successfully provided a platform for sharing knowledge, identifying challenges, and exploring future collaborative opportunities in the integration of physical and digital transportation infrastructures. About 20+ students and faculty researchers participated in the workshop (including online audience), who are informed well about the JSPS programs and application process.

Collaboration Initiatives:

The workshop laid the groundwork for potential long-term collaborative research initiatives between US and Japanese institutions. Specific areas of interest include sustainable construction materials, digital transformation in structural maintenance, and autonomous vehicle safety. Dr. Dang and Dr. Chen will continue to collaborative in the following areas:

- Structural inspection automation through connected sensing, human-in-the loop decision-making and AI

agentic workflows.

- Applied quantum computing for structural health and resilience monitoring and modeling at regional scales.

In the meantime, Dr. Chen will act as a regional liaison between JSPS and researchers within the University of Missouri systems and facilitate collaboration between researchers in Japan and US.

Workshop/Seminar Agenda

Morning Sessions, September 13 (moderator: ZhiQiang Chen)

8:00 AM ~ 9:00 AM	Breakfast
9:00 AM ~ 9:05 AM	Message from Prof. Kevin Truman, Dean of the School of Science and Engineering, UMKC
9:05 AM ~ 10:00 AM	JSPS Information Session
10:00 AM ~ 10:20 AM	Q & A about JSPS program. Dr. ZhiQiang Chen's experience with JSPS Visiting Professorship
10:20 AM ~ 10:45AM	Social hour and coffee break
10:45 ~ 11:30 AM	Keynote presentation: <i>Advanced Structural Maintenance and resilience by Digital Transformation</i> Professor Dang, JI, Saitama University, Japan
11:30 AM ~ 12:15 PM	Keynote presentation: <i>Secure Connected Autonomous Vehicles for Safety in Smart Transportation System</i> ; online Professor Sanjay Madria Missouri University of Science and Technology (Senior JSPS Scholar)
12:15 PM ~ 13:30 PM	Lunch and UMKC Innovation Studio Tour

Afternoon Sessions, September 13 (moderator: ZhiQiang Chen)

1:30 PM ~ 2:15 PM	Keynote presentation: <i>A View Towards the Development and Implementation of Lower Carbon Sustainable Concrete for Infrastructure Application</i> ; online Professor John Myers, Missouri University of Science and Technology, Director of MCTI
2:15 PM ~ 3:00 PM	Keynote presentation: <i>Overview of ERTC³ Research Activities and Findings</i> Professor Ceki Halmen, University of Missouri – Kansas City, Director of ERTC ³
3:00 PM ~ 3:10 PM	Coffee break
3:15 PM ~ 3:45 PM	Technical talk: <i>Understanding Environmental Impact of Transportation Systems Through Causal AI</i> ; online Professor Xinghui Zhao, Washing State University
3:45 PM ~ 4:15 PM	Technical talk: <i>Advances in riverbed roughness quantification in large sand-bed rivers: Implications for navigation and flooding predictions</i> Professor Micah Wyssmann, University of Missouri – Kansas City
4:15 PM ~ 4:45 PM	Technical talk: <i>Advanced Bridge Design Review and Case Studies</i> Professor Thiagarajan Ganesh, University of Missouri – Kansas City
4:45 PM ~ 5:15 PM	Technical talk: <i>Smart Air Quality Monitoring in Urban Space</i> Professor Md Yusuf Uddin, University of Missouri – Kansas City
5:15 PM ~ 5:30 PM	Summary remark, Dr. ZhiQiang Chen; Group photo; Workshop adjourned
6:00 PM ~8:30 PM	Reception Venue to be determined

List of Participants:

Speakers:

Dr. Dang, Ji

Dr. ZhiQiang Chen

Dr. Jejung Lee

Dr. Sanjay Madria

Dr. John Myers

Dr. Ceki Halmen

Dr. Xinghui Zhao

Dr. Micah Wyssmann

Dr. Thiagarajan Ganesh

Dr. Md Yusuf Uddin

Dr. Kevin Truman (in-person meeting with JSPS delegates)

Dr. Sungyop Kim

Dr. Yifei Liu

Dr. Jesse Lowe

Dr. Julie Crowley

Mr. Tate Berry

Post-doctoral scholars: Molan Zhang

Doctoral / Graduate students: Hongcheng Jiang, Bowu Chen, and five other graduate students.

Online participants: eight during the day.