Newsletter
• Fall 2021 •

⟫ Message from the President

Dear APSE members and friends,

Our APSE community has demonstrated great resilience in adopting new means of maintaining continuity and connectivity. Yet we do miss our "face-to-face" interactions for exchange of ideas, planning future activities, and re-energizing our commitment for innovation and academic excellence. For this, we plan to have APSE gathering during the annual meeting of the Transportation Research Board (TRB). Please stay tuned for more information about this gathering!

I would like to share with you some exciting news about recent and upcoming APSE activities:

In order to encourage global APSE membership and participation, we have recently revised the annual membership structure to be consistent with the classification of the World Bank of countries. Please spread the word about this new structure and encourage colleagues to join APSE.

APSE has initiated four task forces that tackle important topics such as sustainability and resilience, tools for characterization of pavement materials, and best practices for publishing. More information is available here.

APSE is organizing a webinar series with focus on emerging and innovative research areas in pavement engineering. These webinars will be delivered by a group of prominent speakers. Please stay tuned to join these webinars and

By the time you are reading this message, you should have also received the announcement regarding the APSE awards to recognize the great achievements of APSE members. I strongly encourage you to nominate your colleagues and students.

We are always looking for members and friends to join our task forces, lead new initiatives, and organize events. Please reach out to me or to any of the APSE officers with any questions or suggestions.

I look forward to seeing you all at our next gathering at TRB.

Dr. Eyad Masad
APSE President

Highlight of recent activities

APSE Task Forces

APSE is currently working on four task forces focusing on important topics, such as education in pavement sustainability and resilience, applications of analytical tools in the characterization of pavement materials, best practices for publishing in pavement science and engineering, and spreading awareness in academia about the status of key journals in our field. The membership of each of these task forces consists of APSE members and pavement professional from diverse backgrounds and expertise.

Task Force 1:
Pavement Sustainability and Resiliency Essentials for Academics.

Chair:
Dr. Hasan Ozer, Arizona State University

The main goal of this task force is to identify gaps related to education in sustainability and resilience concepts in pavement engineering. These concepts include, but are not limited to, quantifying resource consumption,

environmental assessment, socio-economic impacts, and material and design factors. Consequently, the task force will explore the best approaches to address the identified gaps and improve the incorporation of resilience and sustainability in the educational experience. The task force will consider and identify resources (reports, papers, chapters from books, and software) that can be used by instructors and students.

Task Force 2:
A Short Course for Analytical Tools to Characterize Pavement Materials.

Chair:
Dr. Shane Underwood, North Carolina State University

This task force is working to develop a new short course on the chemical and microstructural analysis of pavement materials. The short course is expected to cover both experimental methods as well as simulation software. It will also identify the relationships between measured properties and performance of pavement systems. The course is intended for graduate students and researchers in the area of PS&E.

Task Force 3:
Best Practice Guidelines for Publishing in Pavement Science and Engineering.

Chair:
Dr. Zhen Leng, The Hong Kong Polytechnic University

This task force aims to disseminate best practices or codes for publications in PS&E. The codes available from main publishers in the field will be used as references. The task force will also get input from APSE members who are serving as editors-in-chief or associate editors of scientific journals. The task force will address various issues, including open access versus closed-access (subscription-based) publications, citations, and originality, among other issues.

Task Force 4:
Communication of Status of PS&E Publications.

Chair:
Dr. Silvia Caro, University of Los Andes

The main journals specialized in PS&E are relatively new as most of them started within the past 10-20 years. Some academic institutions and organizations still rank these journals based on outdated metrics or do not account for the significant improvements in the ranks of these journals in various citation databases (e.g., Web of Science, Scopus). This task force is working to gather information about status of the journals in international database, and develop a strategy for communicating the findings to academic institutions and organizations. The work of this task force builds on the findings of a previous task force that conducted a comprehensive evaluation of PS&E journals.

APSE webinars:

In July 2021 APSE held a webinar, "Paving the Way." In this webinar, Dr. Maxwell Lay, Dr. John Metcalf, and Mr. Kieran Sharp provided a summary of the recently published book, *Paving Our Ways*. The speakers provided a comprehensive international history of the world's pavements, running from the earliest human settlements to the present date. This webinar was moderated by Dr. Stefan Romanoschi from the University of Texas at Arlington.

Dr. John Metcalf
Formerly Louisiana State University

Dr. Maxwell Lay
Formerly Director ConnectEast and ARRB

Dr. Stefan Romanoschi
The University of Texas at Arlington

Mr. Kieran Sharp
Road Eng. Assoc. of Asia and Australasia

In October 2021, Dr. José Norambuena-Contreras (University of Bío-Bío, Chile) delivered offered a webinar, "Self-Healing Bituminous Materials for More Sustainable and Resilient Pavements." Dr. Norambuena-Contreras provided a very interesting talk regarding the different technologies to promote the self-healing capacity in bituminous materials from a vision of the waste valorization for more sustainable and resilient asphalt pavements.

>> Student members spotlight

We requested three APSE PhD student members working in artificial intelligence and machine learning in pavement engineering to share with us their ongoing research projects and their interest in this area. Enjoy the read!

Egemen Okte
University of Illinois at Urbana Champaign

Linyi Yao
The Hong Kong Polytechnic University

Mohammad Aljarrah
Texas A&M University

Mr. Egemen Okte
University of Illinois at Urbana Champaign

1. What were the influences for your interest in pavement engineering?

Mr. Okte: While pavement engineering is an established research area, there are so many exciting frontiers to explore. I am also interested in machine learning and data science, and I think there are quite interesting applications of these in pavement engineering.

2. What problem(s) are you trying to solve?
Mr. Okte: My PhD dissertation focuses on improving our pavement design methodologies to cater connected and autonomous vehicles. Autonomous vehicles present some unique challenges to pavement engineers, such as reduced rest period and wheel wander. Because these phenomena can be statistically modeled, we can use statistical methods to quantify the impact of these variables in pavement design. In addition, I am working on building some machine learning models for pavement response and distress prediction. I am quite passionate in this area because I think developing easy-to-use models is crucial for moving pavement engineering forward. The easier it is to use, the more people will use it.

3. Where does your passion for this particular focus come from?
Mr. Okte: As an undergrad, I was always interested in computer programming and writing algorithms. The only drawback for me was that as a civil engineer, I was also interested in solving potential real-world problems. Working in pavement engineering really allows me to bring these two together by developing models that can be used in real-world applications on real roadways. I find that quite rewarding.

4. Current thoughts about where you might be or what you might be doing in five years?
Mr. Okte: I would like to work as a faculty member so hopefully, in five years, I will have my own research team and I will be working on interesting research ideas with them! I am also looking forward to collaboratimg with all the people who are doing amazing work in pavement engineering. I really appreciate how the people in this field are so helpful, selfless, and interested in moving the field forward.

Ms. Linyi Yao
The Hong Kong Polytechnic

1. What were the influences for your interest in pavement engineering?

Ms. Yao: During my master's study, I needed to extract useful information from the huge amount of data stored in the pavement management system. As I had always been good at math, I learned and applied mathematical and statistical methods to effectively and efficiently accomplish this task. I felt excited when I obtained interesting results from the data. Most of the work I have done is closely related to practice, and I could see the contribution of my work, which was encouraging and rewarding.

2. What problem(s) are you trying to solve?

Ms. Yao: My research aims to develop a sustainable and intelligent decision-making framework for allocating limited resources to a large-scale road network while considering the environmental, economic, and social effects of these decisions. To this end, several sub-issues need to be addressed: predicting performance of future pavement infrastructure; selecting appropriate metrics to measure the environmental, economic, and social performance; balancing computation cost and accuracy; considering the interdependencies between road sections, etc.

3. Where does your passion for this particular focus come from?

Ms. Yao: Handling large amounts of data is a significant challenge for those with a purely pavement engineering background. This fueled my passion to learn database management tools, programming software, and machine-learning techniques to manage, analyse, and mine data. I have used traditional and Bayesian neural networks to model pavement performance evolution and found their superiority in fitting complicated real-world data over conventional regression models. I have also employed the reinforcement learning algorithm to solve the pavement maintenance optimization problem and found it yielded significant cost savings compared to the current practice. These successes encourage me to continue to apply machine-learning approaches to address pavement engineering challenges.

4. Current thoughts about where you might be or what you might be doing in five years?

Ms. Yao: I want to be a junior university teacher. I hope that students with a purely pavement engineering background will learn some basic concepts about machine learning and big data analytics, as well as their application in pavement engineering, so they can use these techniques to solve their own problems in the future. I also expect to keep working with the highway agencies to learn about the real challenges they have in pavement management to generate new research ideas and solutions to tackle practical problems.

Mr. Mohammad Aljarrah
Texas A&M University

1. What were the influences for your interest in pavement engineering?

Mr. Aljarrah: During my undergrad studies, I was fascinated by the complexity of asphalt binders. Their viscoelastic thermoplastic time-dependent nature challenged researchers to fully characterize their behavior. A lot has been accomplished but I believe we have only scratched the surface.

2. What problem(s) are you trying to solve?

Mr. Aljarrah: I am developing nanoscale characterization methods that can be used to design sustainable materials with tailored microstructures. I am using Nanoscale Dynamic Mechanical Analysis (nDMA) through Atomic Force Microscopy to characterize the mechanical properties of asphalt binders modified using various modifiers, which has led to more in-depth understanding of the design of such blends. The insights obtained from such fine-scale tests aid in better designs of modified asphalts with improved performance. We utilize the output from the AFM tests to generate virtual representations of asphaltic materials' microstructures by employing stochastic modeling and machine learning techniques to generate computational microstructures, replicating the ones obtained by experimental AFM tests. This data serves as a key input in probabilistic micromechanical modeling, which enhances our perception of asphalt field performance. Integrating stochastic modeling, machine learning techniques, and micromechanical modeling promotes sustainability by creating a virtual testing environment that preserves resources required in the laboratory.

3. Where does your passion for this particular focus come from?

Mr. Aljarrah: When you achieve groundbreaking discoveries, you start falling for what you do. Our study group was the first to capture the nanoscale viscoelastic properties of asphalt binders using the nDMA test. I currently aim to combine my passion towards nanotechnology and machine learning into my research in pavement engineering, as I believe this area is still "wet behind the ears" and a ton of knowledge is yet to be discovered.

4. Current thoughts about where you might be or what you might be doing in five years?

Mr. Aljarrah: To design materials and engineer their properties, you have to fully understand their behavior first. Cutting-edge technologies such as nanotech and machine learning techniques are great tools to achieve such goals. In the upcoming years, I plan to expand my knowledge in these areas and attempt to utilize them in pavement engineering applications. Within five years, I aspire to become a pioneer in developing infrastructure materials that are smart, resilient, and sustainable. TRB.
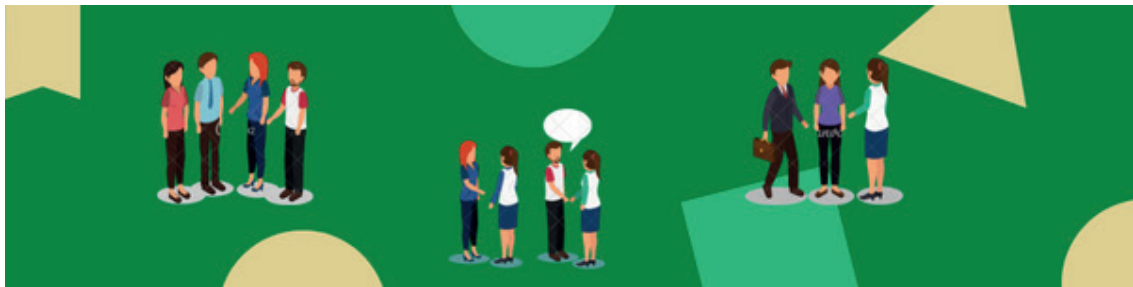

>> New annual APSE membership structure

From November 2021, APSE membership annual dues will be based on the World Bank classification of countries. Help us spread the word and encourage colleagues around the world to be part of APSE now! Check the following link for more information: https://apse.wildapricot.org/Membership

Call for APSE 2022 awards nominations

To promote the field of pavement science and engineering (PS&E) and recognize the excellent work of its students, associate, and academic members from all levels and sub-disciplines throughout the world, we are now calling for the following three APSE awards: 1) Outstanding Academic Member Award, 2) Associate Member Award, and 3) Student Member Award. More information can be found here. Nomination deadline is on **December 20, 2021**.

APSE gathering in Washington D.C. January 2022

APSE will have a gathering event at Washington D.C. on Saturday, January 8 2022 from 3 pm to 5pm! The specific location will be communicated to all our members soon. Stay tuned!

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