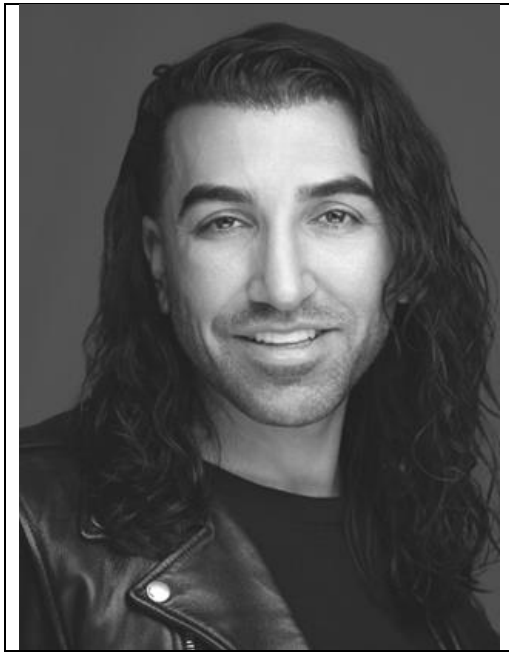
2025 AI in Fire Engineering Summit
May 28-30, 2025
Berkeley, California, USA

SFPE FOUNDATION
Grand Challenges Initiative

2025 AI Summit Speakers, Bios, & Abstracts



Alex Momand, Ph.D.
CEO, FireScore.Ai

Alex Momand is the founder of Firescore, where he leads the charge in fighting fires with data. From shaping sustainable waste policies in developing countries to pioneering AI-driven geospatial intelligence with U.S. fire departments, he's a frontline innovator redefining wildfire prevention shoulder to shoulder with firefighters.

Sponsored Product Demonstration – FireScore.Ai
Thursday, May 29, 1:00 – 1:30 pm

Ali Tohidi, Ph.D.
Assistant Professor, University of Maryland, College Park

Dr. Ali Tohidi is an Assistant Professor of Fire Protection Engineering at the University of Maryland, College Park, and a co-PI of the NSF-IUCRC Wildfire Interdisciplinary Research Center (WIRC). He holds an M.Sc. from Sharif University of Technology, where he studied wind-induced cooling in aquatic canopies, and a Ph.D. in Civil and Environmental Engineering from Clemson University, focusing on wildfire spread mechanisms. Dr. Tohidi's research lies at the intersection of experimental methods, and data-driven and mathematical modeling of complex thermo-fluid systems. His current work is focused on advancing our understanding of wildfire behavior and developing innovative models and tools to estimate the impacts at various scales.

Curating Synthetic & High-Resolution Observational Data for Wildfire Modeling
Wednesday, May 28, 4:10 – 4:35 pm

A robust, accurate, and fast wildfire forecasting system is integral to the resilience of our communities and infrastructure against wildfires. This capability can inform incident response operations in real-time and guide mitigation measures by improving the estimated risks a priori. However, wildfire forecasting at large scales remains challenging due to growing uncertainties in operational simulators and the high computational cost of ensemble forecasts. This is partly due to the scarcity and sparsity of wildfire observations at the flame scale. Additionally, the lack of wildfire observation data makes incident fire reconstruction and model validation challenging. This work adopts a hybrid data-driven approach to develop a fast forecasting framework and curate a high-resolution dataset of wildfire observations using aerial imagery. The synthetic wildfire simulation dataset is spatially explicit, enabling a large number of realizations for ensemble forecasts. The wildfire observation dataset can be used for validation and verification studies of operational models at the landscape scale. Additionally, it can be leveraged to improve the current state of the simulators through various data-fusion techniques, developing new filters applicable to wildfire signals. The presentation also communicates the limitations of the dataset, describing how information from newly

	deployed sensors can complement the data for understanding wildfire dynamics beyond the rate of spread and fire location.
	**Amanda Kimball, P.E., FSFPE** **Executive Director, Fire Protection Research Foundation (NFPA)** **2025 President, Society of Fire Protection Engineers** Amanda Kimball, PE, FSFPE, is the Executive Director at the Fire Protection Research Foundation, the National Fire Protection Association (NFPA) research affiliate. Kimball's experience includes fire protection engineering consulting with expertise in building code life safety analyses, design of fire protection systems, fire and egress modeling of buildings and subway stations, and risk analysis. *Co-Host & Event Moderator*
	**Ben Rogers** **Chief Technology Officer, CAL FIRE** Ben is the Chief Technology Officer at CAL FIRE and is responsible for modernizing the department's use of technology and for adopting emerging technologies responsibly such as Generative AI. He joined CAL FIRE 3 years ago from the private sector where he previously was a director at KPMG and worked for various specialist technology firms in government technology. *Panelist: Is it possible to overcome trust issues with AI?* *Thursday, May 29, 5:45 – 6:30 pm*

Chris Bachman, CFO, FM
Assistant Chief / Fire Marshal, Contra Costa County Fire Protection District

Chris Bachman is currently the Assistant Chief / Fire Marshal for Contra Costa County Fire Protection District, located in the San Francisco Bay Area, the jurisdiction encompasses 12 cities throughout 550 square miles of the county. He relocated to California in 2019 after serving in the ranks of Battalion Chief, Division Chief and Deputy Chief for 14 years in Missouri and Indiana. This advanced level of upper management experience earned him an appointment on the Human Relations Committee with the International Association of Fire Chiefs and the Exam Development Committee with the ICC for Fire Code certifications. Chris is committed to professional development and currently serves as a peer reviewer with the Center for Public Safety Excellence. Since 2012, he has presented on emerging topics in the fire service at State and National Conferences. In 2019, he also earned a Master's Degree in Emergency Management and Disaster Preparedness from Georgetown University.

Fire Service Perspective on Technology and Evacuation
Thursday, May 29, 4:15 – 4:40 pm

Contra Costa County Fire Protection District has utilized technology to combat wildfires with innovative platforms to assist in evacuations and emergency response. This session will provide videos and pictures from wildfire incidents to show the effectiveness of technology to simultaneously implement evacuations while extinguishing the fire.

Chris Lautenberger, P.E., Ph.D.
President & CEO, CloudFire, Inc.

Dr. Chris Lautenberger is President & CEO of CloudFire Inc., a technology company focused on development and deployment of open source wildfire fire spread and risk models to reduce the burden of fire on society. He is a licensed Fire Protection Engineer with expertise in fire science, fire dynamics, fire modelling, and forensic fire reconstruction. Lautenberger's professional activities involve applying fire dynamics and combustion principles to analyze various aspects of fire and combustion processes, ranging from small-scale smoldering combustion to large-scale wildland fire dynamics. He has published on several aspects of combustion and fire, including flammability, pyrolysis, ignition, fire spread, and fire modeling. Lautenberger has over 20 years of experience applying fire dynamics calculations and fire models in support of scientific research, fire protection engineering design, and forensic fire reconstruction. Chris has developed computer models to analyze trajectories and ignition potential of metallic and woody particles generated by conductor clashing and interactions between vegetation and overhead electrical utilities, wildland fire propagation, and wildland fire risk. Lautenberger has provided expert testimony at deposition and trial on more than 25 occasions on litigation matters related to both wildland and structure fires, including several fires with losses in excess of $100M. Dr. Lautenberger was an Instructor in the Department of Fire Protection Engineering at California Polytechnic State University, San Luis Obispo where he has co-taught Masters-level courses in Fire Dynamics and Fire Modeling.

Panelist: AI and fire protection engineering consulting: What does FPE look like in 10 years?
Thursday, May 29, 2:30 – 3:15 pm

	**Corey Kinsman, P.E.** **Fire Protection Engineer and Code Consultant, Performance Based Fire Protection Engineering (now a Summit Company)** Corey Kinsman is a Professional Fire Protection Engineer and Code Consultant with Performance Based Fire Protection Engineering (now a Summit Company). He is licensed in several states and has over 20 years of experience providing fire protection engineering consultation services. Corey is a member of NFPA and ICC and serves on the Executive Committee for the Middle Tennessee Chapter of SFPE. Corey leads the responsible integration of AI technologies in engineering and consulting services at Performance Based Fire. *Panelist: AI and fire protection engineering consulting: What does FPE look like in 10 years? Thursday, May 29, 2:30 – 3:15 pm*
	**Chief Daniel Berlant** **California State Fire Marshal** Daniel Berlant was appointed State Fire Marshal by Governor Gavin Newsom on October 6, 2023. Chief Berlant began his career with CAL FIRE in 2001 as a volunteer and was hired in 2002 in the Fire Prevention Bureau of the Nevada-Yuba-Placer Unit. In 2005, he began working in the CAL FIRE Communications Office as a Fire Prevention Specialist in Sacramento. After several fire sieges and extensive work in the public information function, he was promoted in 2008 to Department Information Officer and was tasked with serving as CAL FIRE's main spokesperson. In 2014, he was promoted to the Chief of Public Information overseeing the Sacramento and Region staff of the Communications Office. In 2016, Chief Berlant was promoted to Assistant Deputy Director at the Office of the State Fire Marshal over the Wildfire Planning & Engineering, and Fire Engineering & Investigations Divisions. The Deputy Director of Community Wildfire Preparedness and Mitigation is new to the Department after being established through the passage of Assembly Bill 9 (2021), which created the Community Wildfire Preparedness and Mitigation Division within the Office State Fire Marshal. The Division will be responsible for the policy and program leadership for Defensible Space,

	Home Hardening/WUI Building Codes, Land Use Planning, Fire Prevention Grants, Pre-Fire/Fire Plan, Utility Wildfire Mitigation, fire hazard/risk mapping, and incident reporting (CalFIRS/NFIRS). In addition, Chief Berlant will continue oversight of the OSFM Fire Engineering & Investigations Division responsible for fire protection related Licensing/Certification, Arson & Bomb, and Fireworks Enforcement/Disposal. Chief Berlant holds a bachelor's degree from the University of California, Davis. *Featured Session (Keynote)* *Thursday, May 29, 3:15 – 3:45 pm*
	**Dave Winnacker** **Moraga-Orinda Fire Chief (retired)** Fire Chief (ret) Dave Winnacker spent 21 years in the fire service in Fresno City, Alameda County, and as chief of the Moraga-Orinda Fire District from 2017-2024. He served as the Western Fire Chiefs Association California Director, as the California Fire Chiefs Association WUI Task Force lead, and as the fire service representative on the California AB9 Wildfire Mitigation Committee and the California AB642 Risk Modeling Advisory Workgroup. At Stanford University he is a Hoover Institution Veteran Fellow working on the intersection of wildfire and property insurance with an emphasis on the pricing of risk. In the private sector he was the co-founding advisor to ZoneHaven, an evacuation software in use throughout California and is a co-founder of XyloPlan Risk, a wildfire risk assessment and visualization company. Prior to joining the fire service, he served on active duty as a Marine Corps Infantry officer from 1997-2004 and has remained in the reserve component. *Panelist: Structural/Wildfire Modeling Applications in California* *Thursday, May 29, 11:20 am – 12:15 pm*

David Flack
Director, Loss Prevention & Control, Cardinal Health

David Flack is Cardinal Health's Director of Loss Prevention & Control responsible for the development and implementation of corporate goals in reducing and mitigating property risks and supporting the company's property insurance program. During his 39 -year career he has held positions including Sr. Engineering Consultant, Regional Manager, Trainer, SVP, Client Executive, and Outsourced Risk Manager at IRI, J&H, Marsh McLennan. David has developed and managed property loss control programs at numerous major companies including Eaton, Honda, RPM, OI, Aerojet, Nordson, MECH, IUC, and Cardinal Health. This has included the management of fire protection installation projects at facilities in 48 countries, designed to NFPA/FM codes/standards. He has managed 20 full-scale fire tests to develop performance-based fire protection designs. David is a NFPA member, on the NFPA Sprinkler Research Planning Council and a Professional Member of SFPE. He resides in Valley City, Ohio with his wife and has four children.

AI and Property Loss Control in Warehouses
Thursday, May 29, 1:55 – 2:20 pm

Introduction on the use of AI within a warehouse occupancy to detect and mitigate property risks. This presentation will review how Cardinal Health is using AI to supplement and improve our property risk control programs at our warehouses. This is being accomplished by using existing camera systems with AI. The AI models being used, provide early detection and warning of a fire situation and identification of conditions that could increase the severity of a property fire. The following will be covered during this presentation:

- Performance criteria for the AI system.
- The AI models developed.
- Challenges encountered as the AI models were deployed.

	**David Saah, Ph.D.** **Managing Principal and Co-Founder, Spatial Informatics Group** David Saah, PhD, is Managing Principal and Co-founder of Spatial Informatics Group, Professor and Director of the Geospatial Analysis Lab at the University of San Francisco, and Chair of the NASA Applied Sciences Advisory Committee. Dr. Saah is a globally recognized leader in geospatial analysis, remote sensing, and natural hazard modeling. His expertise and contributions have significantly advanced the field and supported a wide range of environmental and landscape resilience initiatives. *Panelist: Challenges and needs for shared data/databases for use with AI models and tools* *Wednesday, May 28, 5:15 – 6:00 pm*
	**Derek White, P.E.** **Chief Technical Officer, Jensen Hughes** Derek White is the Chief Technical Officer at Jensen Hughes. In this role, Derek is responsible for global project delivery, maintaining the focus on technical excellence, and equipping the business with technology-based tools that support more consistent and efficient outcomes. A licensed Professional Engineer, Derek holds a B.S. in Mechanical Engineering and a M.S. in Fire Protection Engineering from Worcester Polytechnic Institute. Derek is also dedicated to mentoring future engineers and advancing industry standards through research and collaboration, helping ensure the safety and resilience of infrastructure around the globe. *Panelist: AI and fire protection engineering consulting: What does FPE look like in 10 years?* *Thursday, May 29, 2:30 – 3:15 pm*

Guillermo Rein, Ph.D.
Professor, Imperial College London

Guillermo is Professor of Fire Science and Director of Research at the Department of Mechanical Engineering of Imperial College London, UK. He is also Editor-in-Chief of the SFPE/NFPA journal 'Fire Technology', and Fellow of the Combustion Institute. The purpose of his work is to reduce the worldwide burden of accidental fires and protect people, their property, and the environment.

Review of the Literature on AI in Fire Journals, with Pioneers, Trends, and Gaps
Thursday, May 29, 9:10 – 9:35 am

This paper presents a historical review exploring the application of artificial intelligence (AI) to understand fire dynamics, address fire safety engineering challenges, and model fire behaviour across both the built and natural environments. The review found a wide range of AI techniques used in fire, from simple supervised machine learning algorithms like regression, support vector machine and random forest, to more complex models such as neural networks in different deep learning frameworks. A chronological overview of key developments is presented, tracing the evolution of AI fire research from its pioneering work in 1989 to the exponential growth started in 2010. It encompasses a total of 213 publications in peer-reviewed journals specifically related to fire science. The AI literature covers a variety of phenomena, including smoke and fire detection, flame spread, flame shape, and heat release rate. We highlight the strengths and limitations of AI in solving fire-related problems, particularly in comparison to other methods such as empirical correlations and numerical modelling approaches. Finally, the review identifies current research gaps, such as the overfitting of AI models, need for large, centralised databases, need for conducting sensitivity analysis, which algorithms are used and which are underutilised depending on the use case. It concludes by providing future directions, emphasising the potential of AI to assist fire engineers and scientists in adopting new tools and to improve fire safety.

Panel Facilitator: Structural/Wildfire Modeling Applications in California
Thursday, May 29, 11:20 am – 12:15 pm

Ilkay Altintas, Ph.D.
Research Scientist, University of California, San Diego
Chief Data Science Officer, San Diego Supercomputer Center

Dr. İlkay Altıntaş, a research scientist at the University of California San Diego, is the Chief Data Science Officer of the San Diego Supercomputer Center as well as a Founding Faculty Fellow of the Halıcıoğlu Data Science Institute at the School of Computing, Information and Data Science. With a specialty in scientific workflows and systems, she leads collaborative teams to deliver impactful results and sustainable solutions through making computational data science and AI work more reusable, programmable, scalable, equitable, and reproducible. She is the Founding Director of the Societal Computing and Innovation Lab, which also houses the WIFIRE Program on wildland fire solutions. She is the PI of the NSF National Data Platform and other diverse NSF grants to develop scalable computing, AI and data systems at the digital continuum from edge to HPC. Among the awards she has received are the 2015 IEEE TCSC Award for Excellence in Scalable Computing for Early Career Researchers and the 2017 ACM SIGHPC Emerging Woman Leader in Technical Computing Award. Ilkay serves on the elected Board of Governors for the IEEE Computer Society, and was appointed by California Governor Newsom to the Wildfire Technology Research and Development Review Advisory Board. Ilkay received a Ph.D. degree from the University of Amsterdam.

Keynote: Demystifying AI for Fire Science
Wednesday, May 28, 1:20 – 1:50 pm

Artificial Intelligence (AI) provides opportunities for transforming fire science and solutions—from improving wildfire prediction and detection to optimizing resource allocation and informing mitigation strategies. Yet, for many practitioners and researchers, the complexity of AI tools and the hype surrounding them can obscure their real value. This talk aims to demystify AI by breaking down key concepts, methods, and use cases relevant to fire science. We will explore how machine learning, computer vision, and decision support systems are currently being applied in wildfire modeling, prescribed fire planning, and smoke forecasting. Practical examples from recent projects will illustrate how AI can augment—not replace—

	expertise in fire ecology, operations, and management. We will also address challenges related to data and how AI can be utilized to improve data accuracy, interpretability, and integration into existing knowledge systems and workflows.
	**Jaap de Vries, Ph.D.** **Staff VP, Principal Innovation Specialist, FM** Jaap de Vries, Ph.D., is Staff Vice President and Principal Innovation Specialist at FM Global, and an Adjunct Professor at Brown University's School of Engineering. At FM Global, he leads strategic innovation initiatives, including the development of AI-driven fire protection technologies and evaluating robotic systems for hazardous environments. His recent work explores generative AI applications in risk engineering and digital twin creation for large-scale asset monitoring. With a research background in fire and combustion science, infrared thermography, and computer vision, Jaap has led major fire testing programs and holds two patents in smart fire protection. He also encourages entrepreneurship; he teaches Technology Entrepreneurship in the PRIME master's program and mentors startups through RIHub's Venture Mentoring Services. Jaap serves on Rhode Island's Science and Technology Advisory Council, supporting innovation policy. Jaap earned a B.S. in Aeronautical Engineering from the College of Amsterdam, an M.S. in Aerospace Engineering from the University of Central Florida, and a Ph.D. in Mechanical Engineering from Texas A&M University. *AI in Fire Protection Engineering: Impacts on Insurance and Loss Prevention* *Wednesday, May 28, 3:45 – 4:10 pm* Artificial Intelligence (AI) is rapidly impacting fire protection engineering by introducing tools for risk mitigation, system reliability, and operational efficiency. For FM, a mutual insurance company focused on property loss prevention, AI is a strategic enabler of data-driven (fire) risk management. This presentation explores the intersection of AI and fire protection through emerging research and real-world applications. It begins with established AI techniques such as computer vision, now used for early fire and flame detection, as well as for analyzing vegetation and terrain features from satellite imagery—critical for both structural fire safety and wildfire response. Other practical applications include automated detection of impaired

	sprinkler valve positions, a common cause of large-loss events. The session also briefly highlights the role of robotics in enhancing safety and inspection in hazardous environments. FM's development of a 30-foot water tube boiler testbed for robotic non-destructive testing (NDT) demonstrates how robotics can enable safer and more thorough system evaluations. Beyond detection and inspection, the presentation examines how physics-informed AI can impact fire modeling. These hybrid approaches improve modeling efficiency in areas such as thermal radiation, and evaluation through flame image segmentation. The talk also addresses generative AI, which supports engineers through natural language fire code interactions, while raising important questions about skill retention and the evolving role of the fire protection engineer; aiming to start a discussion on future directions, challenges, and ethical considerations for responsible AI deployment in fire protection engineering.
	**Jason Webb** **Potter Electric Signal** Jason Webb is a fire protection industry affairs consultant and trainer with over 35 years industry experience. After retiring from a long fire service career which included over a decade as AHJ in a high-growth metropolitan fire department, he has been a fire safety advocate, trainer, program developer/director, and consultant for industry associations as well as a global manufacturer of fire protection equipment. He is an accomplished author and instructor, providing continuing education for firefighters, fire and building code officials, fire protection contractors, facility managers, and design professionals for more than twenty years. He is an active member of the ICC, NFPA, NFSA, AFSA, AFAA, FSSA and SFPE and sits on numerous codes and standards development committees. *Panelist: Challenges and needs for shared data/databases for use with AI models and tools* *Wednesday, May 28, 5:15 – 6:00 pm*

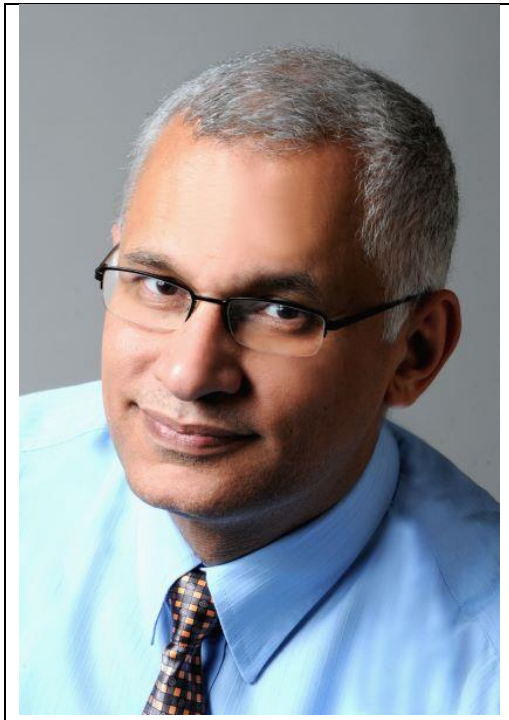
Jonathan Hodges, Ph.D.
Director of Modeling, Jensen Hughes

Dr. Hodges brings a unique blend of academic research, industry experience, and technical expertise to his role as the Director of Modeling at Jensen Hughes. He leads projects focused on Artificial Intelligence, improving fire models, developing experimental methods, and fire risk assessment. These have led to improvements in safety requirements for rail cars, maritime vessels, battery energy storage systems, and the wildland urban interface (WUI). Dr. Hodges is also a model developer, with contributions to the Fire Dynamics Simulator (FDS) project, customized fire models for targeted applications, and development of AI applications for process efficiency in the nuclear power industry. Throughout his career, Dr. Hodges has demonstrated a commitment to advancing the applied science of fire safety and risk analysis. He serves the broader fire protection industry as a member of the SFPE Foundation board of governors and as a member of the editorial board for the Fire Safety Journal.

Panelist: What is AI, and where is it heading?
Panel Topic: AI and the role of the fire protection engineer
Wednesday, May 28, 2:20 – 3:15

Recent advancements in Artificial Intelligence (AI) technology have paved the way for innovation in technology and tools in numerous sectors. The rate at which these technologies are evolving the workflow of industry professionals in the fire protection industry is remarkable. However, there is a risk that the rapid development of these technologies will continue to outpace changes to regulations, standards, and industry guidance. While AI is a topic of discussion on numerous committees developing these consensus documents, it takes time for committees to develop new and agree on updates to existing documents. As a result, the responsible use of AI in the fire protection engineering discipline falls on the individual or group using the technology. Researchers have demonstrated the potential benefits of AI for our society in many ways, but there is a gap in training practitioners on its responsible use in our industry. This presentation will discuss the responsible use of AI in our industry, and a discussion of the potential future of these technologies.

	Verification and Validation of AI Systems for Digitalized DIOM of FP Systems *Thursday, May 29, 1:30 – 1:55 pm*
	**Kevin J. Sehlmeyer** **Michigan State Fire Marshal (retired)** Kevin Sehlmeyer served as the Michigan State Fire Marshal from 2017 to 2025. Kevin has been involved in the fire service for 40 years. Kevin retired from the Grand Rapids, MI, Fire Department in 2016. He held many ranks within the Grand Rapids Fire Department, from 1985 to 2016 and retired as the Deputy Fire Chief. In April of 2017 he was appointed the State Fire Marshal by Governor Rick Snyder and served an additional 6 years as State Fire Marshal for Governor Gretchen Whitmer. Sehlmeyer led a state-wide community risk reduction effort known as MI Prevention to make communities safer and reduce fire fatalities during his tenure as the state fire marshal. MI Prevention is the national leader in Community Risk Reduction. Kevin retired from the State Fire Marshal position in March 2025 to advocate, educate, and inform those most at risk of dying from fire. Based on his fire marshal experience, he has decided to join Sonic Alert promoting Sonic Alert's premier home alerting notification technology. *Panelist: Is it possible to overcome trust issues with AI?* *Thursday, May 29, 5:45 – 6:30 pm*



Khalid Mosalam, Ph.D., P.E.
Professor & Director of the Pacific Earthquake Engineering Research (PEER) Center, University of California, Berkeley

Khalid M. Mosalam, the Taisei Professor of Civil Engineering and Director of PEER at the University of California, Berkeley. Mosalam's research focuses on the performance and health monitoring of structures, assessment, and rehabilitation of essential facilities, based on large-scale computations and experiments.

Prediction of the Most Fire-Sensitive Point in Building Structures with Differentiable Agents for Thermal Simulators
Thursday, May 29, 10:00 – 10:25 am

Fire safety is crucial for ensuring the stability of building structures, yet evaluating whether a structure meets fire safety requirement is challenging. Fires can originate at any point within a structure, and simulating every potential fire scenario is both expensive and time-consuming. To address this challenge, we propose the concept of the Most Fire-Sensitive Point (MFSP) and an efficient machine learning framework for its identification. The MFSP is defined as the location at which a fire, if initiated, would cause the most severe detrimental impact on the building's stability, effectively representing the worst-case fire scenario. In our framework, a Graph Neural Network (GNN) serves as an efficient and differentiable agent for conventional Finite Element Analysis (FEA) simulators by predicting the Maximum Interstory Drift Ratio (MIDR) under fire, which then guides the training and evaluation of the MFSP predictor. Additionally, we enhance our framework with a novel edge update mechanism and a transfer learning-based training scheme. Evaluations on a large-scale simulation dataset demonstrate the good performance of the proposed framework in identifying the MFSP, offering a transformative tool for optimizing fire safety assessments in structural design. All developed datasets and codes are open-sourced online.

Leslie Marshall, Ph.D.
Director, SFPE Foundation

Leslie Marshall, Ph.D. is Director of the SFPE Foundation, a global non-profit organization affiliated with the Society of Fire Protection Engineers that supports research and education to improve the scientific understanding of fire and its interaction with the social, natural, and built environments. Dr. Marshall oversees all Foundation programs: facilitating professional awards, student scholarships, and research grants; leading cross-sectoral research collaborations; conducting research workshops and meetings; developing initiatives to support the next generation of fire protection engineers; and disseminating knowledge to advance the field of fire engineering and fire safety science. An affiliate of the Economic and Social Rights Research Group of the University of Connecticut's Human Rights Institute, Dr. Marshall has published multiple policy reports and academic journal articles and frequently speaks on resilience and sustainability, economic development, and energy infrastructure and workforce transition. She has consulted for the United Nations Development Programme, Innovations for Poverty Action, the Centre for Women in Governance, and the Lebanese Center for Policy Studies, among others.

Co-Host & Event Moderator

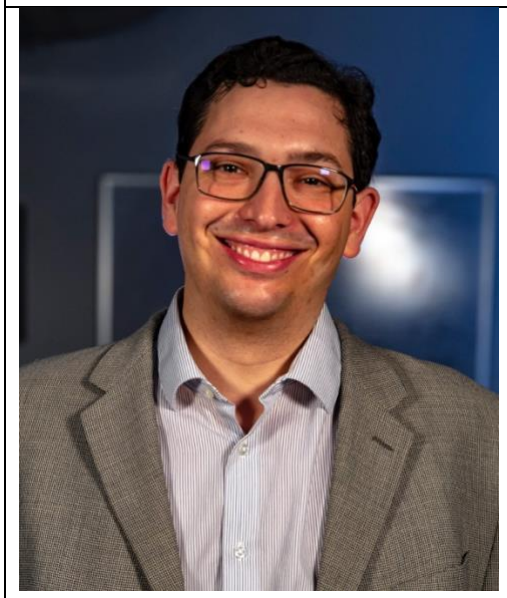
M. Hamed Mozaffari, Ph.D., PEng
Research Officer, National Research Council Canada

Dr. Hamed Mozaffari, P.Eng. is a Research Officer at the National Research Council Canada, specializing in Artificial Intelligence (AI), Machine Learning (ML), and Computer Vision (CV). He holds a Ph.D. in Electrical Engineering and Computer Science from the University of Ottawa. His work focuses on integrating advanced technologies like Building Information Modelling (BIM), Digital Twins, and IoT into construction and fire safety projects. Dr. Mozaffari is actively involved in initiatives such as research and development at VISTA laboratory in topics such as fire risk assessment, wildfire monitoring, smart firefighter, aiming to improve safety measures at construction. In addition to his research, Dr. Mozaffari contributes to academia as a Status-Only Assistant Professor at the University of Toronto. His dedication to innovation and education is recognized through awards and an extensive collection of peer-reviewed scientific articles, which advance knowledge in AI and digital transformation. Dr. Mozaffari is committed to enhancing safety and sustainability through technology, making significant strides in digital transformation and AI applications for a safer future.

Application Of AI and Computer Vision in Assisting Firefighting: Flashover Prediction and Detection
Thursday, May 29, 5:05 – 5:30 pm

The integration of Artificial Intelligence (AI) and Computer Vision (CV) into firefighting methodologies represents a significant advancement in the prediction and detection of sudden fire growth phenomena such as flashover. The ability to forecast sudden fire propagation in advance of an occurrence can substantially enhance the efficacy of rescue and firefighting operations. Traditionally, the analysis of flashover including predictions of the onset relied on time series data, such as temperature measurements from fixed sensors in controlled experimental settings. This study introduces a novel approach by employing Generative AI to predict rapid room fire development using spatial and temporal infrared (IR) video data from real-scale room fire tests. For the first time, a sophisticated recurrent neural network designed for computer vision, specifically the Convolutional Long Short-term Memory (ConvLSTM) model, has been utilized to achieve precise predictions of room fire growth.

	Experimental results indicate that ConvLSTM can forecast room fire growth with exceptional precision, marking a significant improvement in prediction accuracy. The AI model demonstrates a high degree of reliability in forecasting the short-term future of room fires, even across diverse domains and conditions. These findings underscore the potential of leveraging ConvLSTM and image-based techniques in fire prediction, emphasizing the importance of developing vision-based solutions that incorporate deep learning algorithms. Such advancements could play a pivotal role in enhancing situational awareness and decision-making processes during firefighting and rescue operations, thus providing invaluable support in managing fire emergencies with greater efficacy and safety. This innovative approach promises to fundamentally improve the capabilities and effectiveness of contemporary firefighting techniques.
	**Matthias Ihme, Ph.D.** **Professor, Stanford University** Matthias Ihme is Professor in the Department of Mechanical Engineering and Energy Science & Engineering (by courtesy) at Stanford and the Department of Photon Science at SLAC National Accelerator Laboratory. He holds a BSc. degree in Mechanical Engineering, a MSc. degree in Computational Engineering, and a Ph.D. in Mechanical Engineering. His research interests are broadly on the computational modeling of reacting flows, the development of numerical methods, scientific machine learning, and the investigation of advanced energy conversion concepts and ultrafast molecular processes. He is a recipient of the NSF CAREER Award, the ONR Young Investigator Award, the AFOSR Young Investigator Award, the NASA Early Career Faculty Award, the Hiroshi Tsuji Early Career Research Award, and the Bessel Award of Alexander von Humboldt Foundation. *Keynote: Artificial Intelligence As An Agent To Suppress Fires: How Can ML Address Challenges In Wildfire Management?* *Wednesday, May 28, 1:50 – 2:20 pm* Wildfires present a major threat to society, environment, and ecosystems. While significant progress has been made in predicting, mitigating, and controlling wildfires, advances in

	machine learning (ML) and artificial intelligence (AI) offer unique opportunities to address threats that arise from increasingly severe wildfires. This talk will provide an overview of recent developments on (i) harnessing ML-enabled hardware architectures and programming paradigms to achieve high-fidelity real-time simulations of large-scale wildfires, (ii) utilizing ML techniques to learn fire-spread dynamics from large datasets and observations, and (iii) leveraging data and observations to accelerate scientific discovery, education, and community adoption. Examples in real-time prediction of extreme wildfires, the discovery of fire-spread dynamics using ML techniques, and the prediction of health-impacts from wildfires will be presented to illustrate applications of these new AI capabilities and how they can impact future strategies for wildfire management and fire mitigation.
	**Michael Gollner, Ph.D.** **Associate Professor, University of California, Berkeley** Dr. Michael Gollner is an Associate Professor and Deb Faculty Fellow in the Department of Mechanical Engineering at the University of California, Berkeley where he leads the Berkeley Fire Research Lab. He received his Ph.D. in Mechanical Engineering from the University of California, San Diego and was an Associate Professor of Fire Protection Engineering at the University of Maryland, College Park, MD from 2012-2019. Dr. Gollner studies how fires ignite and spread within the wildland-urban interface (WUI), the physics and dynamics of wildland fire spread, the processes by which structures ignite from embers, and emissions and associated health effects from wildfire smoke. He is the recipient of numerous awards from the NSF, IAFSS, IAWF, NFPA and Combustion Institute and has sat on boards and committees for many of the same organizations. *Isolating the Primary Drivers of Fire Risk to Structures in WUI regions in California* *Thursday, May 29, 9:35 – 10:00 am* The destructive impacts of Wildland-Urban Interface (WUI) fires on people, property, and the environment have dramatically increased, particularly in California. We analyze 5 historical WUI fires with the DINS dataset to assess patterns of structure loss and the effectiveness of mitigation measures. We employ advanced machine learning models to predict structure

	survival probabilities based on a combination of exposure metrics and mitigation factors, including incorporation of new urban fire spread modeling. Our findings highlight that structure separation and exposure to flames and embers are among the most significant factors influencing the probability of structure loss and a hypothetical loss reduction analysis shows that enhancing home hardening and vegetation clearance could reduce structure losses by up to 52%. *Panelist: Structural/Wildfire Modeling Applications in California* *Thursday, May 29, 11:20 am – 12:15 pm*
	**Mike Peterson, Ph.D.** **Deputy Commissioner, Climate and Sustainability Branch, California Department of Insurance** Michael Peterson is currently the inaugural Deputy Commissioner of the Climate and Sustainability Branch for Insurance Commissioner Ricardo Lara at the California Department of Insurance. In this role, Peterson is leading multiple initiatives to reduce climate risk and strengthen resilience, including work on the California Climate Insurance Working Group (https://www.insurance.ca.gov/cci/), which focuses on resiliency through closing protection gaps and employing nature-based solutions. Peterson also leads a partnership with the United Nations Principles for Sustainable Insurance (UN PSI) that developed the California Sustainable Insurance Roadmap (https://www.insurance.ca.gov/01-consumers/180-climate-change/The-Sustainable-Insurance-Roadmap.cfm), released in 2022 and the first sustainable insurance strategy and action plan of its kind, including new steps to reduce greenhouse gas emissions, close insurance protection gaps, and accelerate climate resilience. Prior to his current position, Peterson was a policy consultant in the California State Senate, focusing on climate change, natural resources, air quality, and energy policy. Peterson has a background researching biology and physiology, earning a PhD in Environmental Science, Policy and Management from the University of California, Berkeley, and a Masters degree at Western Washington University. *Panelist: Structural/Wildfire Modeling Applications in California*

	Thursday, May 29, 11:20 am – 12:15 pm
	**Milosh Puchovsky, P.E., FSFPE** **Professor & Associate Department Head, Worcester Polytechnic Institute** Milosh is Professor of Practice & Associate Department Head for Fire Protection Engineering at Worcester Polytechnic Institute. Milosh possesses over 35 years' experience applying and teaching performance-based fire hazard analysis, fire protection system design and interpretation of regulatory norms. Milosh chairs and serves on numerous technical committees of the NFPA, SFPE, UL, and the American Red Cross. Milosh is former Secretary to NFPA's Standards Council and Past President of SFPE. Milosh is an editor of the Handbook of Fire Projection Engineering and holds degrees in mechanical and fire protection engineering. *Panelist: What is AI, and where is it heading?* *Panel Topic: Integrating AI into the curriculum* *Wednesday, May 28, 2:20 – 3:15 pm* The integration of Artificial Intelligence (AI) into fire protection engineering education offers both great potential and serious pitfalls for a student's learning outcomes and growth. This aspect of the panel discussion presents concepts for incorporating AI into a graduate-level fire protection engineering curriculum. The aim is to foster dialogue on how AI can expand the student's knowledge, enhance their diagnostic and problem-solving capabilities and better develop their decision-making skills.

MZ Naser, P.E., Ph.D.
Assistant Professor, Clemson University

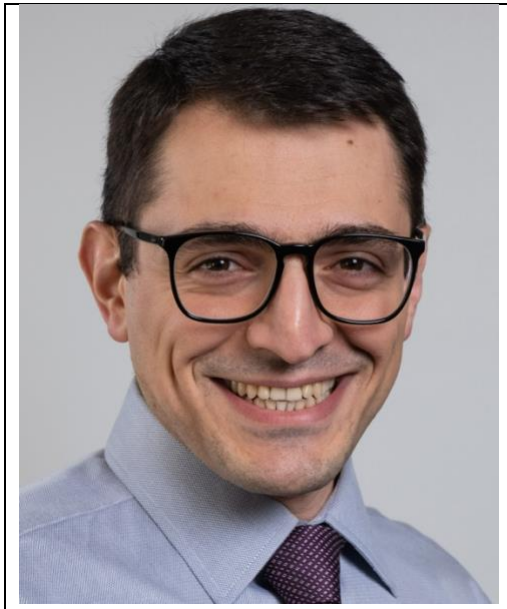
Dr. M.Z. Naser is a professional engineer and an assistant professor at the School of Civil and Environmental Engineering and Earth Sciences at Clemson University and a faculty member of the AI Research Institute for Science and Engineering (AIRISE). Dr. Naser serves as the current chair of the American Society of Civil Engineers (ASCE) Advances in Information Technology (AIT) committee and a voting member of various national and international engineering institutions. Dr. Naser's research creates causal and explainable machine learning methodologies to help us realize functional, sustainable, and resilient infrastructure. He has co-authored over 140 peer-reviewed publications, including a new textbook on machine learning and civil engineering, titled "Machine Learning for Civil and Environmental Engineers: A Practical Approach to Data-Driven Analysis, Explainability, and Causality" by Wiley. He is listed in the company with the world's most impactful researchers by Elsevier and Stanford University, ranking among the world's top 2% of scientists for two constitutive years (2022-2023).

Panelist: What is AI, and where is it heading?
Panel Topic: What [explainable] AI is, and how it relates to fire engineering and ethics
Wednesday, May 28, 2:20 – 3:15 pm

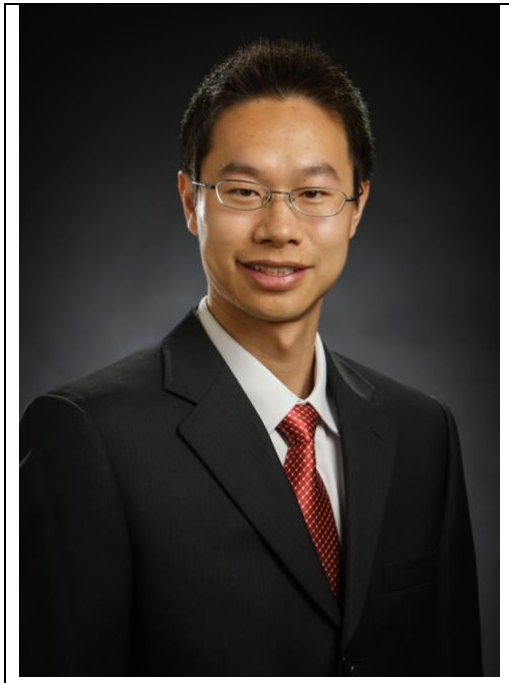
Nalini Venkatasubramanian, Ph.D.
Professor, University of California, Irvine

Nalini Venkatasubramanian is a Professor in the School of Information and Computer Science and Co-Director for the Center for Emergency Response Technologies at the University of California Irvine. She has had significant research and industry experience in distributed systems, adaptive middleware, pervasive and mobile computing, cyberphysical systems and has over 350 publications in these areas. She is the recipient of the NSF Career Award, multiple Teaching Excellence Awards, best paper awards and was named as one of the "Stars in Networking" by the CRA . Prof. Venkatasubramanian has served in advisory committees for governmental agencies, steering and organizing committees of conferences on middleware, distributed computing and cyberphysical systems and on the editorial boards of journals. She received her Ph.D. in Computer Science from the University of Illinois in Urbana-Champaign. Prior to arriving at UC Irvine, Nalini was a Research Staff Member at the Hewlett-Packard Laboratories in Palo Alto, California. Prof. Venkatasubramanian is an IEEE Fellow, AAAS Fellow, and an ACM Distinguished Engineer,

Panelist: Challenges and needs for shared data/databases for use with AI models and tools
Wednesday, May 28, 5:15 – 6:00 pm

	**Nima Masoudvaziri, Ph.D.** **Senior Engineer, Catastrophe Engineering and Analytics, Berkshire Hathaway Specialty Insurance** Nima is a senior engineer in Catastrophe Engineering and Analytics team at Berkshire Hathaway Specialty Insurance. His work focuses on developing, evaluating, and implementing probabilistic risk assessment methodologies, with a particular emphasis on wildfire risk as applied to conventional building structures and non-conventional structures. He holds a PhD in Civil Engineering from the University at Buffalo, where his research centered on modeling fire spread and analyzing the impacts of wildfires at the wildland-urban-interface. Nima's expertise bridges engineering, data analytics, and wildfire science to better understand and manage catastrophe risk. *Panelist: Structural/Wildfire Modeling Applications in California* *Thursday, May 29, 11:20 am – 12:15 pm*
	**Peter Senez, Ph.D., P.Eng., ing.** **Principal and President, Senez Co.** Peter Senez is a professional engineer with over 30 years of experience. He is well-practiced in complex building and fire code design matters pertaining to fire and life safety and has a combined background in design, forensics, fire fighting and fire research. As an active participant in the fire industry since 1988, Peter has positioned himself as a leader in fire protection engineering and performance-based design in Canada, the US, and abroad. Throughout his career, he has worked to develop the profession by creatively adapting industry tools to solve complex fire problems, stimulating a collaborative work environment with his colleagues and peers, and sharing insight into the industry. *Panel Facilitator: AI and fire protection engineering consulting: What does FPE look like in 10 years?* *Thursday, May 29, 2:30 – 3:15 pm*

	**Qianru Guo, P.E., Ph.D.** **Senior Project Manager, Simpson Gumpertz and Heger** Qianru Guo holds a Ph.D. in Structural Engineering from the University of Michigan and brings over 10 years of experience in fire protection engineering consulting. Her expertise spans performance-based design, including smoke control analysis, timed egress modeling, and structural fire engineering. Qianru is passionate about advancing the application of artificial intelligence and machine learning in fire protection, particularly in automating fire modeling, egress analysis, and code compliance documentation. *Panelist: AI and fire protection engineering consulting: What does FPE look like in 10 years?* *Thursday, May 29, 2:30 – 3:15 pm*



Qingsheng Wang, Ph.D., P.E., CSP
Professor, Texas A&M University

Dr. Wang is a Professor and George Armistead '23 Faculty Fellow in the Artie McFerrin Department of Chemical Engineering at Texas A&M University (TAMU). Before rejoining TAMU in 2019, he served as the Dale F. Janes Endowed Professor at Oklahoma State University. Dr. Wang received his BS and MS in Chemistry from Zhejiang University and his PhD in Chemical Engineering from TAMU under the supervision of the late M.S. Mannan and F.A. Cotton. With nearly 20 years of experience in process safety and fire safety, Dr. Wang has published nearly 200 journal papers, 12 book chapters, 2 books, and holds 3 patents. He has successfully supervised 20 PhD students and 29 MS students, with three pursuing academic careers and the others contributing to the energy industry. Currently, Dr. Wang leads the TAMU Multiscale Process Safety Laboratory, where he pioneers research in process safety, machine learning, and flame-retardant polymers.

AI Prediction of Flammability and Flammable Dispersion
Thursday, May 29, 10:40 – 11:05 am

Properties such as lower flammable limit and upper flammable limit are critical factors in assessing fire safety. This research aims to develop an expanded database of flammability properties for chemical mixtures. Utilizing machine-learning algorithms, we can enhance quantitative structure-property relationship (QSPR) analysis by refining descriptor selection and improving model performance. Furthermore, the inadvertent release of flammable gases and liquids can result in the formation of hazardous vapor clouds, posing significant risks to chemical plants and neighboring communities. This research bridges the gap between micro-focused QSPR investigations and macro-focused consequence prediction models to create highly efficient quantitative property-consequence relationship (QPCR) models. These AI-based QPCR models accurately forecast flammable and toxic dispersion, such as downwind maximum distance, minimum distance, and maximum vapor cloud width within specific concentration limits or lethality thresholds. They enable rapid estimation of flammable and toxic dispersion for various chemicals at reduced computational costs. The implementation of

	AI-based QSPR and QPCR prediction tools can offer valuable guidance for complying with process safety management (PSM) regulations.
	**Ralf Bruyninckx, Msc** **CEO, FPC Risk, part of Sweco** Ralf graduated in 1998 as the first European fire engineer from Worcester University in Massachusetts. Prior to that, he obtained a Master's degree in Economics from the University of Antwerp. Ralf has gained extensive international experience studying the impact of different cultures on fire safety. For 25 years, he developed and led an international consultancy FPC Risk specialized in fire safety and emergency management. His combined background, knowledge, and experience help define specific market needs and translate them into innovative and cost-effective fire safety solutions for clients, government agencies, and the industry in general. Within Sweco, he is responsible for the further development of the Fire Risk and Emergency Management business. *Panelist: AI and fire protection engineering consulting: What does FPE look like in 10 years? Thursday, May 29, 2:30 – 3:15 pm*

Robin Zevotek, P.E.
Principal Fire Protection Engineer, NFPA

Robin is a Principal Fire Protection Engineer with the Technical Services department at the National Fire Protection Association where he provides technical expertise in fire protection and building life safety as well as emergency response and responder safety. He holds both Bachelor's and Master's Degrees in Fire Protection Engineering from the University of Maryland. With experience in extensive work in fire engineering and research, and over 20yrs in the field of fire and emergency services, he provides a unique blend of technical knowledge and practical experience. In addition to his work at NFPA, he continues to gain practical experience and apply his expertise as the fire chief with the Ellicott City Volunteer Fire Department in Howard County, MD.

Panelist: Is it possible to overcome trust issues with AI?
Thursday, May 29, 5:45 – 6:30 pm

Ruchira Datta, Ph.D.
Chief Data Officer, FireScore.Ai

After getting a bachelor's in math from Caltech and a master's in computer science from UC Berkeley, Ruchira S. Datta obtained a doctorate in math from UC Berkeley, specializing in game theory. Dr. Datta then joined Google. It was in this role that Dr. Datta began working on AI/ML for natural language processing and received four patents, two as sole inventor and two with one co-inventor. Dr. Datta then began research in computational biology. During this postdoctoral research, Dr. Datta applied hidden Markov models, multimodal networks, and stochastic simulation (including spatial simulation) to model various biological processes. After consulting on various data science projects, Dr. Datta joined CAS, a division of the American Chemical Society. Here Dr. Datta applied AI/ML for natural language processing to improve search and relevance of SciFinder-n, the flagship paid scientific search engine produced by CAS. Meanwhile Dr. Datta took coursework in immunology and co-led the Innate and Adaptive Immune Response Modeling Subgroup of GLIMPRINT. Seeking to apply AI for reducing and mitigating climate change, Dr. Datta joined [M&R USA] as Chief Data Officer in 2024.

Panelist: Challenges and needs for shared data/databases for use with AI models and tools
Wednesday, May 28, 5:15 – 6:00 pm

Seth Sienkiewicz, P.E., FSFPE
Staff VP, Principal Research Engineer, Fire Testing Manager, FM

Panel Facilitator: Challenges and needs for shared data/databases for use with AI models and tools
Wednesday, May 28, 5:15 – 6:00 pm

Shuna Ni, Ph.D.
Assistant Professor, University of Maryland, College Park

Dr. Shuna Ni is an Assistant Professor of Fire Protection Engineering at the University of Maryland, joined in 2022. Prior to UMD, Dr. Ni was an Assistant Professor at Utah State University and a postdoctoral fellow at Johns Hopkins University. Ni's research focuses on structural fire engineering, fire forensics, fire resilience of wildland-urban interface communities, impact of fire on civil infrastructure and fire safety of tall mass-timber buildings. Ni has authored over 40 peer-reviewed publications, conference presentations, and proceedings. Her research has been funded by the National Science Foundation, National Institute of Justice, Fire Protection Research Foundation, University Transportation Centers, BLM-National Interagency Fire Center, Grand Challenges Grants Program at the University of Maryland, and industrial partners such as FM.

Automated Image-Based Identification and Consistent Classification of Fire Patterns with Quantitative Shape Analysis and Spatial Location
Wednesday, May 28, 4:35 – 5:00 pm

Fire patterns, consisting of fire effects that offer insights into fire behavior and origin, are currently classified based on investigators' visual observations, leading to subjective interpretations. This study proposes a quantitative fire pattern classification framework to support fire investigators, aiming for consistency and accuracy. The framework integrates four components. First, it leverages human-computer interaction to extract fire patterns from surfaces, combining investigator expertise with computational analysis. Second, it employs an aspect ratio-based random forest model to classify fire pattern shapes. Third, fire scene point cloud segmentation enables identification of fire-affected areas and mapping 2D fire patterns to 3D scenes for spatial relationships analysis. Lastly, spatial relationships between fire patterns and elements support an interpretation of fire scenes. These components provide pattern analysis that synthesizes qualitative and quantitative data. The framework's fire pattern shape classification results achieve 93% precision on synthetic data and 83% on real fire patterns.

Tsu-Jae King Liu, Ph.D.
Dean and Roy W. Carlson Professor of Engineering, University of California, Berkeley

Welcome & Opening Remarks
Wednesday, May 28, 1:00 pm

Xilei Zhao, Ph.D.
Assistant Professor, University of Florida

Dr. Xilei Zhao is the Director of Smart, Effective, Resilient Mobility Systems (SERMOS) Lab and Assistant Professor of Civil Engineering at the University of Florida. Dr. Zhao received a Master's degree in Applied Mathematics and Statistics and a Ph.D. degree in Civil Engineering from the Johns Hopkins University in 2017. She specializes in developing trustworthy AI and data science methodologies to tackle challenging problems in disaster resilience and transportation systems. Her research has been recognized by multiple awards, e.g., the 2024 NSF CAREER Award, the National Academies' Early-Career Research Fellowship, and the 2020 Travel Behaviour and Society Outstanding Paper Award. Dr. Zhao is currently co-leading the USDOT Tier 1 University Transportation Center, the Center for Transit-Oriented Communities (CETOC), and serving on the editorial board of Data Science for Transportation.

Panelist: What is AI, and where is it heading?
Panel Topic: Why we need to establish a trustworthy AI research and education framework
Wednesday, May 28, 2:20 – 3:15

Increase in frequency and severity of wildfires has resulted in greater harm to human lives, civil infrastructure, and the economy. An essential step toward building wildfire resilience requires deep understanding and robust modeling of human behavior before, during, and after wildfire events. Research on harnessing AI to enhance human behavioral modeling in wildfires is emerging but still in its infancy. Notably, many of the current models function as a black box and have not thoroughly considered critical issues such as trustworthiness, bias, and fairness. This presentation discusses the critical need for establishing a trustworthy AI research and education framework for modeling human behavior in wildfires.

Xinyan Huang, Ph.D., CEng
Associate Professor, The Hong Kong Polytechnic University

Dr. Xinyan Huang is an Associate Professor at the Department of Building Environment and Energy Engineering, The Hong Kong Polytechnic University. He received his PhD from Imperial College London and was a Postdoc at the UC Berkeley. He has co-authored 200+ papers on combustion, fire dynamics, and smart firefighting and trained 20+ PhD students and postdocs. Xinyan is an Associate Editor of Fire Technology and International Journal of Wildland Fire, and a board member of International Association for Fire Safety Science (IAFSS) and International Association of Wildland Fire (IAWF). He is a winner of the NSFC Excellent Young Scientist Fund, Bernard Lewis Fellowship from Combustion Institute, IAFSS Early Career Award, and Bono Engineering Communication Award twice from Society of Fire Protection Engineers (SFPE).

AI Applications In Smart Firefighting
Thursday, May 29, 4:40 – 5:05 pm

Over the past decade, new technologies of big data, Artificial Intelligence, and digital twin have been dominating the research frontier. The emerging applications of AI enable more intelligent fire detection, fire hazard assessment and real-time fire forecast. This talk will introduce my journey of learning and using AI in doing new fire research topics and share what we have achieved so far. I will also touch the challenges in applying these new AI-powered technologies and large language model in fire engineering and firefighting practices. Finally, this talk will share my view about the future trends and potential revolution in future fire engineering practices.

Panel Facilitator: Is it possible to overcome trust issues with AI?
Thursday, May 29, 5:45 – 6:30 pm

Yoon Ko, Ph.D.
Senior Research Officer, National Research Council Canada

Dr. Ko is a Senior Research Officer at NRCC (National Research Council Canada), and leading the Fire Safety Scient and Technology team. Dr. Ko has been building foundations at NRC Fire Safety, needed for breakthrough in the field of smart fire safety, and smoke/fire image processing, which is in turn to bring significant advancement on fire analytics, expansions of NRC FS research capability, and shifts in firefighting/rescue & fire investigation practices. She is also leading research activitis for new emerging research areas: BIM Integration for fire safety, and Hydrogen fire safety, and fire modelling of new energy systems (PV and EV).

Panelist: What is AI, and where is it heading?
Panel Topic: What digitalization means, and how AI fits in
Wednesday, May 28, 2:20 – 3:15