THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學
UGC 大學教育資助委員會 University Grants Committee
SureFire Smart Urban Resilience and Firefighting

UGC Funded Research Project T22-505/19-N

2nd International Smart Firefighting Workshop

SureFire 2024

Smart Urban Resilience and Firefighting

Program Book

9 July 2024 | Hong Kong

2nd International Smart Firefighting Workshop

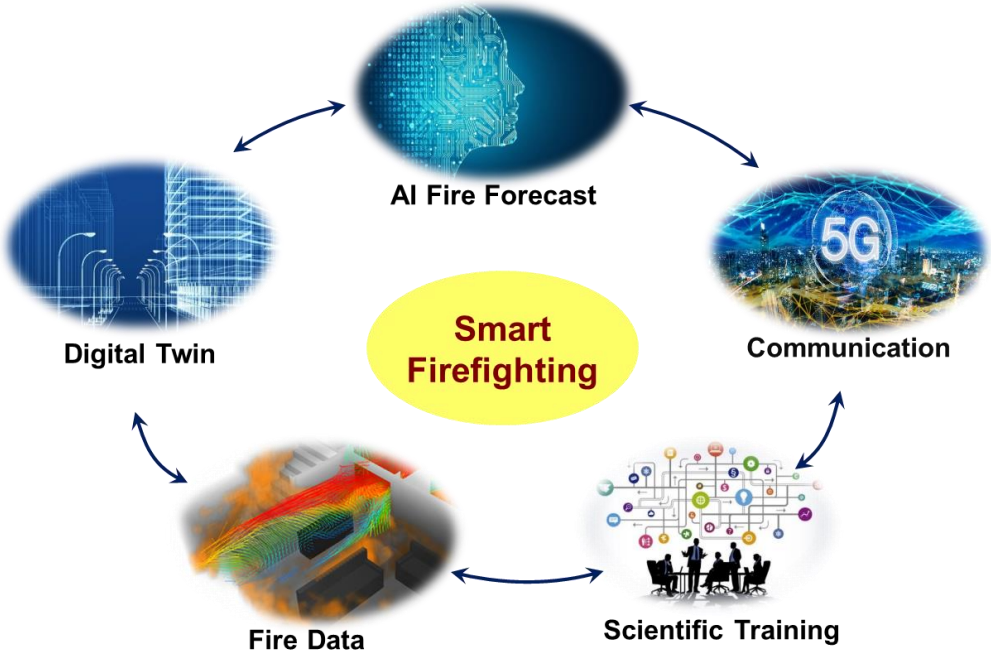
SureFire 2024

Date: 9 July 2024 (Tuesday)

Venue: Block Z, The Hong Kong Polytechnic University

About SureFire Workshop 2024

The Hong Kong Polytechnic University will host the 2nd International Smart Firefighting Workshop (SureFire 2024) on 9 July 2024 (Tuesday), following the 1st workshop at Tsinghua University in 2023. We extend a warm invitation to everyone to join us in Hong Kong for this engaging and informative one-day workshop at The Hong Kong Polytechnic University.



The rise in fires in tall buildings globally highlights how the changing built environment has altered the fire threat. Smart Urban Resilience and Firefighting (SureFire), as part of the smart city blueprint, utilizes sophisticated data networks and AIoT technologies and achieves real-time monitoring and intelligent emergency response for fire hazards in complex urban environments. The development of a smart firefighting system will help develop future smart buildings and smart cities.

For more details about the SureFire project, please visit the following **QR code** to visit the SureFire website.

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Organizing Committee

Chairman of the Workshop

Asif Usmani

Co-Chairman of the Workshop

Xinyan Huang

Organizing Secretariat:

Weikang XIE weikang.xie@polyu.edu.hk

Wai Kit CHEUNG wai-kit-wilson.cheung@connect.polyu.hk

Leading Organizer

THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

Department of Building Environment and Energy Engineering 建築環境及能源工程學系

SFPE Hong Kong Student Chapter

SureFire Global Collaborators

Funding Information:

SureFire project is funded by The University Grants Committee (UGC) of Hong Kong under the Theme-based Research Scheme (T22-505/19-N).

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Overall Program

Date	*Time*	*Agenda*
8 July 2024 (Monday)	16:00 – 19:00	**Workshop Check-in** (Z211) **Campus and Lab Tour**
9 July 2024 (Tuesday)	8:00 – 8:50	**On-site Registration & Check-in** (Z211)
	8:50 – 12:15	**Keynote Presentations** (Z211)
	14:00 – 17:45	**Parallel Sessions and Brainstorm** Session A: Fire Safety and Resilience (Z503) Session B: Firefighting and Emergency Response (Z504)

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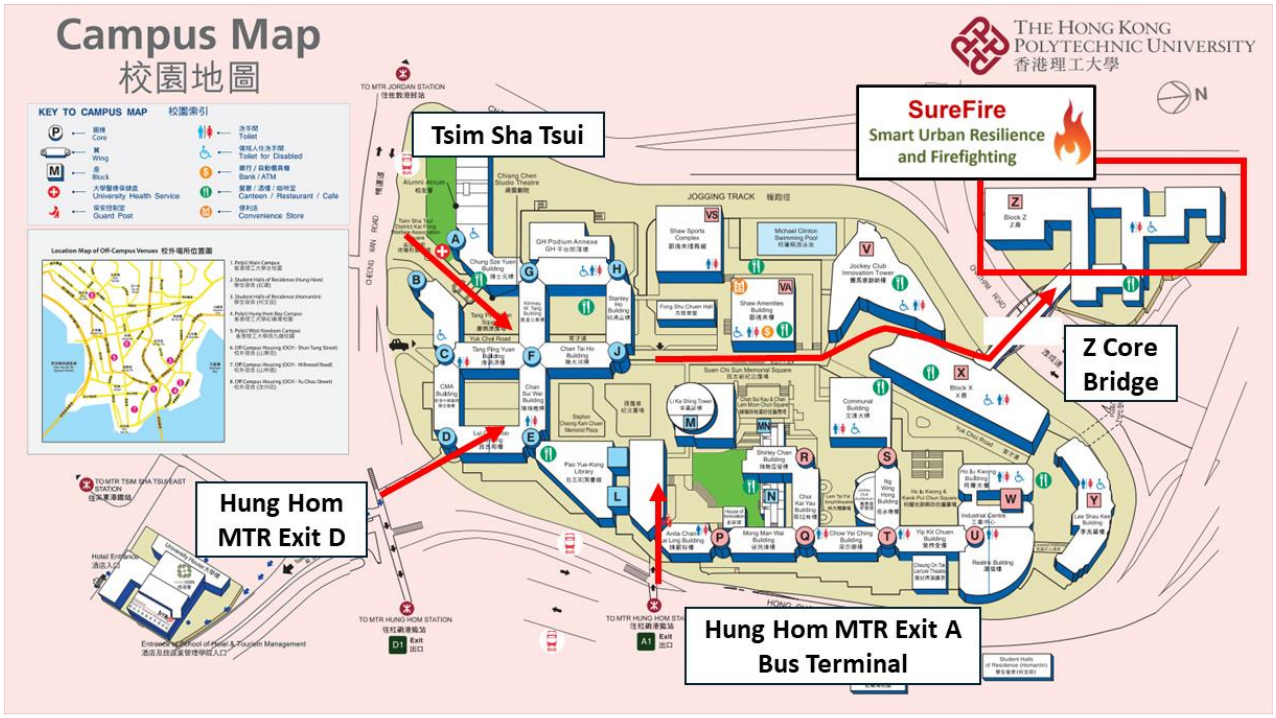
Workshop Location

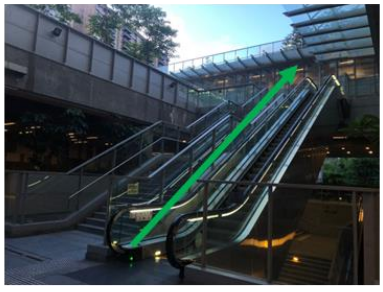


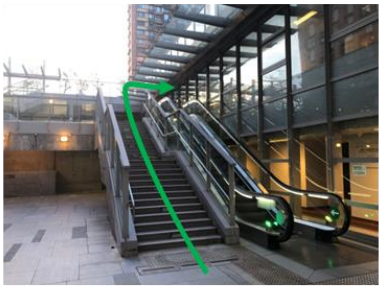
Z Core Bridge to Block Z

Direction to Block Z

Direction to Z211

Direction to Z503/4





2nd International Smart Firefighting Workshop (SureFire 2024)

Date: 9 July 2024 (Tuesday) **Location**: Block Z, The Hong Kong Polytechnic University

Time	*Morning Keynote Session (Room Z211)*
8:00 - 8:50	**Registration**
Session I (Chair: Xinyan HUANG)	
8:50 - 9:00	***Opening Speech*** Linda XIAO & Asif USMANI (The Hong Kong Polytechnic University)
9:00 - 9:25	***Research Progress on Smart Urban Resilience and Firefighting*** Xinyan HUANG (The Hong Kong Polytechnic University)
9:25 - 9:50	***Machine Learning-Based Forecasting for Building Fire*** Andy TAM (NIST)
9:50 - 10:15	***Learning Complex Regulatory Rules and Evacuation Patterns for Better Fire Safety Design*** Xinzheng LU (Tsinghua University)
10:15 - 10:30	**Group Photo and Tea Break (15 min)**
Session II (Chair: Andy TAM)	
10:30 - 10:55	***Enhancing Fire Safety using Augmented Reality and Virtual Reality*** Ruggiero LOVREGLIO (Massey University)
10:55 - 11:25	***Integration of Fire Engineering Solutions into Smart Building Digital Platforms*** Young WONG & Celsius CHUNG (Arup)
11:25 – 11:50	***Operando Monitoring of Internal State during Cycling and Thermal Runaway in Commercial Lithium-ion Battery via Advanced Lab-on-fiber Technology*** Qingsong WANG (University of Science and Technology of China)
11:50 - 12:15	***Fire Performance of Polymeric Materials in Vehicle Interior*** Maryam GHODRAT (University of New South Wales)
12:15 – 14:00	**Lunch Break**

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Afternoon Parallel Sessions		
Afternoon Session (I)	***Session A (Room Z503)*** ***Fire Safety and Resilience*** **Chair: Maryam GHODRAT**	***Session B (Room Z504)*** ***Firefighting and Emergency Response*** **Chair: Liming JIANG**
14:00 - 14:20	***AI-driven Fire Field Prediction and ASET Analysis for Complex-shaped Atriums*** Yanfu ZENG	***Multi-camera Person Re-identification Tracking for Evacuation Monitoring and Emergency Digital Twins*** Yifei DING
14:20 - 14:40	***Molecular Characterisation on Flame Retardant Mechanisms of Phosphorous-based Polymer Composites*** Anthony YUEN	***Smart Forecast of Tunnel Fire Scenario and Hazard based on External Smoke Images*** Caiyi XIONG
14:40 - 15:00	***Study on the Effects of Confined Space Opening Pressure and Ignition Energy on the Explosion Flame of AlSi10Mg Dust*** Lei PANG	***A Brief Introduction for Large-scale Fire Experimental Facility and Some Experimental Results*** Xianjia HUANG
15:00 - 15:20	***Stability Analysis of Steel Members with Irregular Sections under Nonuniform Fire*** Guanhua LI	***Wildfire Rescue Missions Utilize Air Drone Carriers Planning*** Aoran CHENG
15:20 - 15:50	**Tea Break** **+** **Poster Session (30 min)**	

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Afternoon Session (II)	***Session A (Room Z503)*** ***Fire Safety and Resilience***	***Session B (Room Z504)*** ***Firefighting and Emergency Response***
	Chair: Zilong WANG	**Chair: Aoran CHENG**
15:50 - 16:10	***WWF XFire Xtinct Forest Fire Innovation Challenge (XFire): Experience and Insights as a Judge*** Zahi TOHIR	***An Active Opening Strategy for Mitigating Fast Fire Development in Large Compartments*** Liming JIANG
16:10 - 16:30	***Insights on the Similarities and Differences of Combustion Characteristics between Internal Combustion Device and Fire Safety Science —What can we do together?*** Yanqing CUI	***Heterogeneous Intensity-Based DBSCAN Model for Digital Twin Attention of Urban Safety*** Yishuo JIANG
16:30 – 16:50	***Dynamic Thermogravimetric Characteristics of Chinese Fire during Combustion with Samples of Different Biological Age*** Shiping LU	***Intelligent Dynamic Exit Sign System: The Framework and a Demonstration in a Lab-scale Tunnel*** Ho Yin WONG
16:50 - 17:10	***The Evolution Law for Thermal Breakage Behavior of Tilted Glass under High-temperature Loading*** Dan YANG	***Fire Disturbance in Coniferous Forest of Altai Mountain, Xinjiang*** Ruicheng HONG
17:10 - 17:45	**Discussion and Brainstorm**	

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Poster Session (Outside Z503/Z504)	
Zilong WANG	Fire Vigilance Pocket: A Web App for Intelligent Fire Identification
Tianhang ZHANG	A Data-fusion Framework to Recognize Building Fire Risks: A Full-scale Demonstration
Yichao ZHANG	Resurfacing of Underground Peat Fire: Smouldering Transition to Flaming Wildfire on Litter Surface
Rong DENG	3D Temperature Field Modeling for Field Fires Based on Super-resolution Reconstruction and RGB-T Enhancement
Yuying CHEN	The Role of Fuel Properties on Oxygen Thresholds of Smouldering Fire
Yuxin Zhou	Study of Flame-retardant Epoxy Resin/Aerogel Composites as a Barrier to Thermal Runaway Propagation in Lithium-ion Batteries
Meng WANG	A Fast and Accurate Targeting System for Firefighting Robot
Peiyi SUN	The Effects of Scale on Solid Fuel Mass Burning Flux and Flame Behavior
Wai Kit CHEUNG	Real-time Predictions of Fire Information and Fields through Fire Detector Data and Deep Learning
Saizhe DING	Real-time Flame Detection based on Event Cameras
Yuchen WANG	Optimizing the Application of Fire Protection through Reinforcement Learning Techniques
Weikang XIE	Real-time Fire Monitoring and Forecast for Smart Building Firefighting Powered by AIOT
Wei JI	Early Warning on Fire-induced Building Collapse
Juanjuan Zhang	Intelligent AI-aided Building Fuel Load Surveying Methodology
Congliang YE	Thermal Field Investigation of Li-ion Battery Cell Based on Water Cooling
Xiaoning ZHANG	Vision-based Vehicle Tracking and Fire Risk Evaluation for Road Tunnel
Yuxin ZHANG	Roles of Corridors, Staircases and Exit Doors of a Multi-functional University Building Evacuation Drill
Lei ZHANG	Computational Modelling of Fire Hazard Propagation Driven by Thermal Runaway Following Nail Penetration

Dr. Xinyan HUANG
The Hong Kong Polytechnic University

Research Progress on Smart Urban Resilience and Firefighting

Abstract

Over the past decade, big data and Artificial Intelligence (AI) have enabled new technologies to improve fire safety. The emerging applications of AI enable more intelligent fire detection, fire hazard assessment and real-time fire forecast. This talk will introduce the latest development of SureFire project and the future framework for using Artificial Intelligence of Things (AIoT) sensor networks and intelligent robots to help forecast and fight fire. I will also talk about the guidelines for constructing a reliable fire database, propose new concepts for building fire Digital Twin, and review deep learning algorithms that enable the real-time fire quantification, forecast of fire development, and robotic firefighting.

Biography

Dr Xinyan Huang is an Associate Professor at the Dept of Building Environment and Energy Engineering, The Hong Kong Polytechnic University. He received his PhD from Imperial College London, MSc from UC San Diego and BEng from Southeast University. Before moving to HK, Dr Huang was a Postdoc at UC Berkeley and worked with NASA on microgravity combustion. Dr Huang has co-authored over 200 journal papers on combustion and fire research. He served as an Associate Editor of International Journal of Wildland Fire and Fire Technology, and a board member of International Association of Wildland Fire (IAWF) and International Association of Fire Safety Science (IAFSS). He is a winner of the NSFC Excellent Young Scientists Fund, Bernard Lewis Fellowship and Sugden Best Paper Award from the Combustion Institute, Ricardo Award from the Institute of Physics, and Early Career Award from IAFSS.

Dr. Andy TAM
NIST

Machine Learning-Based Forecasting for Building Fire

Abstract

In this talk, the development of a flashover prediction model, which can be used to warn firefighters before a flashover occurs, will be presented. Specifically, the speaker will talk about how a machine learning (ML) paradigm can be used to 1) overcome numerical bottlenecks for real-time calculations and 2) correlate the complex relationships between temperature signals and flashover conditions in various multi-compartment building structures with realistic fire and heat sensing conditions. The speaker will also share the ongoing research efforts that provide more understanding and transparency of the ML model. It is believed that the presented works can contribute a step forward to bring trustworthy ML systems to fire safety applications and to enhance situational awareness for firefighting safety that can help reduce firefighter injuries and deaths.

Biography

Dr. Andy Tam is a Mechanical Engineer in the Fire Fighting Technology Group of the Fire Research Division of the Engineering Laboratory at the National Institute of Standards and Technology. Before his tenure, Andy was an NRC Postdoctoral Research Associate at NIST after receiving his Ph.D. in Mechanical Engineering from the Hong Kong Polytechnic University, where he developed the neural network-based radiation solver (RADNNET-ZM) for heat transfer analysis in fire research. His research interests are thermal radiation heat transfer, machine learning for interdisciplinary research studies on smart firefighting, firefighters' health monitoring, cooktop fire prevention, and heat transfer analysis for lithium-ion batteries.

Prof. Xinzheng LU
Tsinghua University

Learning Complex Regulatory Rules and Evacuation Patters for Better Fire Safety Design

Abstract

Effective design is essential for the safety and resilience of buildings and structures. To ensure the quality of design, repetitive design checking and modification are common in a design process. However, the current compliance checking, and performance simulation of building fire safety still primarily relies on manual methods, which are subjective, time-consuming, and error-prone, making it hard to improve the design quality and fire safety of buildings. There is an urgent need to improve the design checking and performance simulation process for better fire safety design.

Despite the efforts to improve the efficiency of automated compliance checking (ARC), how to effectively extract complex compliance rules from regulatory documents remains challenging, limiting the coverage of available regulatory rules and the effectiveness of ARC. Meanwhile, once certain rules are violated and performance simulation is required for further design modification and improvement, extensive efforts are usually unavoidable to model the dynamics and patterns of emergency evacuation.

This study addresses those issues via emerging language models and generative AI. On one side, a domain-specific language model (DSLM) and knowledge graph (KG) are first developed. Algorithms for clause classification, semantic labelling and alignment, and function identification are proposed based on DSLM and KG, forming an end-to-end rule interpretation framework for learning both simple and complex rules from regulatory documents. On the other side, a diffusion model is introduced to learn complex evacuation patterns from plenty of simulation results, and a rapid performance evaluation method for fire emergency evacuation is proposed, boosting the efficiency by 16 times.

Biography

Prof. Lu got his BS and Ph.D. degrees from Tsinghua University of China. Now he is a full professor and the Head of the Institute of Disaster Prevention and Mitigation of the Department of Civil Engineering at Tsinghua University. He is also the Editor-in-Chief of the Engineering Mechanics journal of China Society of Theoretical and Applied Mechanics, Associate Editor of Journal of Structural Engineering-ASCE and Journal of Computing in Civil Engineering-ASCE, and a member of the editorial boards of Earthquake Engineering & Structural Dynamics and Journal of Earthquake Engineering.

Prof. Lu's major research interests cover structural intelligent design, disaster prevention and mitigation. He has been listed as one of the "most cited Chinese researchers from 2014-2023" by Elsevier. Many of his research findings have been adopted by ACI guidelines, Chinese national and industrial design codes, important simulation platforms such as OpenSees and US-NSF NHERI SimCenter, and landmark buildings such as CITIC Tower (528 m), Beijing. He has received several important awards, including the Second Class National Natural Science Award, the First-Class Science and Technology Progress Award of Beijing (first contributor), the First-Class Natural Science Award of Ministry of Education of China (first contributor), the Distinguished Professor of the Chang Jiang Scholars Program, the XPLORER PRIZE of the Tencent Foundation, Gold Award with congratulations of the jury of International Exhibition of Inventions of Geneva, and the J. M. Ko Award.

Dr. Ruggiero LOVREGLIO
Massey University

Enhancing Fire Safety using Augmented Reality and Virtual Reality

Abstract

This presentation will provide an overview on how Augmented Reality and Virtual Reality have been applied to enhance Fire Safety in the built environment from the design stage of a building to its operation. These presentations will show the benefits and limitations of these two technologies. Finally, this presentation will show how generative AI can help overcoming many of the existing challenges.

Biography

Ruggiero Lovreglio is an Associate Professor at the School of Built Environment, Massey University, New Zealand. He is a Rutheford Discovery Fellow for the Royal Society Te Apārangi, New Zealand. He holds a PhD in Civil Engineering from the joint PhD School of Politecnico di Bari, Politecnico di Milano and Politecnico di Torino. His research focuses on XR application for safety training and human behaviour in disasters. He is an Associate Editor for Safety Science and Fire Technology and member of the editorial board of Fire Safety Journal and Virtual Reality.

Ir. Dr. Young WONG
Arup Hong Kong

Integration of Fire Engineering Solutions into Smart Building Digital Platforms

Abstract

Fire engineering solutions for buildings traditionally involve creating numerous fire scenarios and conducting assessments to demonstrate an adequate level of safety. These assessments are based on various assumptions and often utilize computer simulations. Historically, the results of these assessments are compiled into reports that are seldom revisited once the building is in operation. However, with the advent of next-generation smart building digital platforms, there is an opportunity to incorporate fire and life safety information into these platforms. This integration allows for design information to be easily accessed by building operators, which can be invaluable in preparing fire safety management and action plans, and during alterations and additions (A&A) throughout the building's lifecycle. Furthermore, real-time building operation data can be collected and fed into the digital platform, providing opportunities to verify assumptions and assessments, and implement necessary improvements. This paper presents two project examples where fire and life safety design information is proposed to be incorporated into a smart building digital platform, facilitating a one-stop solution for building operators to manage their buildings.

Biography

Ir Dr Young Wong is a Director at Arup and the leader of the East Asia Region Technical Specialist Services portfolio. With over 25 years of experience in fire safety engineering and design, he has developed a technical specialization in structural fire engineering. His extensive career includes working on some of the tallest buildings and largest infrastructure projects in Hong Kong, China, and Southeast Asia. In addition to his engineering consultancy expertise, Ir Dr Wong has recently focused on integrating digital technology into fire safety design. He is currently serving as a board director at Neuron, a joint venture start-up that is pioneering a digital platform for smart building technology.

Ir Dr. Wong is a Registered Professional Engineer and a Fellow of the Hong Kong Institution of Engineers (HKIE). He also holds the position of Council Member for the Institution of Fire Engineers (IFE) Hong Kong Branch. Furthermore, he is a Chartered Engineer and a Fellow Member of the Institution of Fire Engineers, reflecting his significant contributions and commitment to the field of fire engineering.

Prof. Qingsong WANG
University of Science and Technology of China

Operando Monitoring of Internal State during Cycling and Thermal Runaway in Commercial Lithium-ion Battery via Advanced Lab-on-fiber Technologies

Abstract

Operando monitoring of complex physical and chemical activities inside rechargeable lithium-ion batteries during cycling and thermal runaway is critical to understanding the internal state and thermal runaway mechanisms and giving early warning of safety-related failure. However, most existing sensors cannot survive during such extremely hazardous thermal runaway processes (temperature up to 500 °C accompanied by fire and explosion). To address this, we develop a compact and multifunctional optical fiber sensor (125 μm in diameter) capable of insertion into commercial 18650 cells to continuously monitor internal temperature and pressure effects during cell cycling and thermal runaway. We experimentally demonstrated that implanted FBG and thermocouple sensors show very similar temperature response curves, but the FBG sensor provide a much better signal-to-noise ratio. We observe a stable and reproducible correlation between the cell thermal runaway and the optical response. The sensor's signal shows two internal pressure peaks corresponding to safety venting and initiation of thermal runaway. Further analysis reveals that a scalable solution for predicting imminent thermal runaway is the detection of the abrupt turning range of the differential curves of cell temperature and pressure, which corresponds to an internal transformation between the cell reversible and irreversible reactions. By raising an alert even before safety venting, this new operando measurement tool can provide crucial capabilities in cell safety assessment and warning of thermal runaway.

Biography

Qingsong Wang received his Ph.D. degree in Safety Science and Technology from University of Science and Technology of China (USTC) in 2005. From 2007 to 2009, He worked as the Marie Curie International Incoming Fellowships at Kingston University London. He is a professor and group leader of Industrial Fire Group at State Key Laboratory of Fire Science, USTC. He is the fellow of the Institution of Engineering and Technology (FIET 2020) and the fellow of the Royal Society of Chemistry (FRSC). His main research interests are in lithium-ion battery safety, e.g., thermal runaway mechanism, fire behavior, thermal management, fire prevention of lithium-ion batteries etc. He has published more than 200 pre-viewed journal papers, and they were cited more than 18000 times. He services as guest editors of Safety Science, Fire Technology et al.

Dr. Maryam GHODRAT
University of New South Wales

Fire Performance of Polymeric Materials in Vehicle Interior

Abstract

Motor vehicles on average contain 150kg of plastic content with 10 -15% of these being plastic composites. This project characterised and identified the burning behaviours of common polymeric materials in vehicle Interior. Considerable research exists in the field of burning behaviours of polymers; however, the environment of a vehicle and vehicle fires pose different conditions for flammability. Polymeric materials exhibit complex combustion behaviours encompassing several stages, including solid, gas and interphase phases. The flammability of a polymeric material depends on the conditions and environment the material is in, requiring heat, fuel and oxygen to ignite and sustain a flame. This research analyses the impact of this relationship on the degradation and chemical process underpinning polymeric materials.

The experimental process involved using a Burner Box to gather information on the burn time of the samples, rate of flame spread, combustion behaviours, smoke generation and ignition times. The set aims were achieved by characterising these materials using Fourier transform infrared spectroscopy combined with a direct flame testing methodology, to gather necessary information on the states of these polymeric materials before and after combustion.

Biography

Dr. Maryam Ghodrat is a Senior Lecturer and leader of the “Adaptive Design for Resilient Infrastructure” Research Group at UNSW. She established Pyrometric Laboratory at UNSW Canberra that offers state of the art facilities and expertise to evaluate fire performance of materials, products and systems under direct and indirect flame. The lab is also equipped with a modular subsonic combustion wind tunnel for visualisation of flame propagation in Wildland Urban Interface Scenarios.

Dr Ghodrat’s research in the field of fire dynamics covers bench scale experiments, development of new numerical methods and large-scale simulations on HPC systems. She is currently working on range of different research projects including experimental investigation of the factors affecting performance of firefighters' protective clothing, smouldering of soft furnishings component materials at multiple scales, smouldering combustion in loose-fill fibre thermal insulation and measurement of the tendency of wooden openings to smouldering ignition by embers.

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Catering in PolyU

1. Z Canteen
2/F, Block Z
Asian and Western Food

2. Lassana Coffee
Podium Level, Block W
Noodles, Bakery & Coffee

3. Jiang Nan Delight
4/F, Communal Building
Chinese Noodles & Rice

4. H Café
Podium Level, Block FGHJ
Western Breakfast & Burgers

5. Terrace in Seaside
G/F, Chung Sze Yuen Building
Korean Food

Fortune Malls (置富都會)
Food Court & Restaurants

Science Museum Road
Street Food & Many Restaurants

For more PolyU catering outlets, please visit:

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THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

QS World University Rankings by Subject

In the QS World University Rankings by Subject 2024, PolyU has achieved commendable results, with 5 subjects in global top 20 and 21 subjects ranked among the world's top 100.
The results testify to PolyU's academic excellence as a world leader in a number of subjects. The University will further develop its reputation as a university that excels in education, research and innovation, making even greater contributions for the well-being of society.

- #11 Hospitality & Leisure Management
- #14 Architecture & Built Environment
- #14 Civil & Structural Engineering
- #19 Art & Design
- #19 Marketing
- #31 Nursing
- #32 Data Science & Artificial Intelligence
- #46 Environmental Sciences
- #51 Business & Management Studies

- #61 Accounting & Finance
- #73 Mechanical, Aeronautical & Manufacturing Engineering

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THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

#74 Electrical & Electronic Engineering

#79 Social Sciences & Management (Broad Subject Area)

#88 Computer Science & Information Systems

#97 Engineering & Technology (Broad Subject Area)

#97 Materials Sciences

#100 Arts & Humanities (Broad Subject Area)

#100 Linguistics

#51-100 Geography

#51-100 Sports-Related Subjects

#51-100 Statistics & Operational Research

#1 Hospitality & Leisure Management

#1 Civil & Structural Engineering

#1 Art & Design

#1 Marketing

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Faculty of Construction and Environment
建設及環境學院

BEEE

Dept. of Building Environment and Energy Engineering
建設環境及能源工程學系

Department of Building Environment and Energy Engineering
建築環境及能源工程學系

BRE

Dept. of Building & Real Estate
建築及房地產學系

DEPARTMENT OF BUILDING & REAL ESTATE
建築及房地產學系
INTERNATIONAL • COLLABORATIVE • CONSTRUCTION

CEE

Dept. of Civil & Environmental Engineering
土木及環境工程學系

Department of Civil and Environmental Engineering
土木及環境工程學系
CEE

LSGI

Dept. of Land Surveying & Geo-informatics
土地測量及地理資訊學系

LSGI
Department of Land Surveying and Geo-informatics
土地測量及地理資訊學系

Department of
Building Environment and Energy Engineering
建築環境及能源工程學系

Bachelor of Engineering (Honours) Building Sciences and Engineering
建築科學及工程學(榮譽)工學士組合課程
Full-time 4-year Government-funded Programme

BEng (Hons) in Structural and Fire Safety Engineering (Full-time)
JUPAS Code: JS3777

Master of Science in Building Services Engineering
屋宇設備工程學理學碩士學位

Master of Engineering in Building Services Engineering
屋宇設備工程學工學碩士學位

Master of Science in High Performance Buildings
高效能建築理學碩士學位

Master of Science in Fire and Safety Engineering
消防及安全工程學理學碩士學位

Master of Science in Facility Management
設施管理理學碩士學位

Master of Science in Carbon Neutral Cities and Urban Sustainability
碳中和城市及可持續性理學碩士學位

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Department of
Building Environment and Energy Engineering
建築環境及能源工程學系

Head of Unit
Dept of Building Environment and Energy Engineering, PolyU

Professor Asif Usmani (Chair of Workshop)

The Department of Building Environment and Energy Engineering (BEEE) was officially established in December 1981 (formerly referred to as the Department of Building Services Engineering). We have been serving Hong Kong's building services engineering industry ever since, promoting sustainable, efficient and healthy indoor and urban living environments in one of the world's greatest cities by providing world class teaching and conducting internationally leading research. BEEE is one of the constituent departments of the Faculty of Construction and Environment and offers a full range of taught and research-based study programmes leading to awards from Bachelor of Engineering (BEng) to Masters (MSc and MEng) right up to Doctor of Philosophy (PhD).

Among many challenges confronting the world, perhaps the most critical is to provide high quality living environments to rapidly urbanising and ageing populations under the creeping threat of a worsening climate and increasing environmental pollution. UN forecasts that the world's population will reach 9.7 billion by 2050. 70% of the people are projected to live in urban areas, placing enormous strain on cities and the environment. To deal effectively with these challenges, future building engineers will need to be data savvy and work in interdisciplinary teams to deliver optimal solutions enabling smart urban environments incorporating elements such as vertical farms; renewables driven integrated buildings and transport systems; citywide recycling and so on for a sustainable planet and a smart and resilient built environment. In order to promote this vision, we have designed state of the art study programmes providing the best possible training to our students in designing high performance buildings and building systems through judicious exploitation of the sciences and contemporary technologies such as sensor and comms networks, AI and IoT techniques, data science and programming, BIM and digital twin systems etc. This is consistent with our mission, stated as, **to imagine, engineer and promote sustainable, salutogenic and safe environments for human habitation**.

I would like to take this opportunity to thank you for your interest in our department and programmes and hope you'll join us in learning to promote smarter urban environments for a better and more sustainable future for humanity and our planet.

Fire Asia 2024

COLLABORATION AND TECHNOLOGY

BETTER PREPARE THE COMMUNITY FOR EMERGENCY

10 – 12 July 2024

Hong Kong Convention and Exhibition Centre

ABOUT

Welcome to Fire Asia 2024, where the field of fire engineering embraces the evolving landscape of safety in our modern world. In this proactive and technologically driven approach, advanced technologies have significantly progressed fire risk mitigation, emergency response optimization and community safeguarding.

Over the past three decades, Fire Asia has united global experts in fire engineering, paramedics, medical professionals, and emergency responders. At Fire Asia 2024, themed "Collaboration and Technology - Better Prepare the Community for Emergency（掌握科技力量 共推應急準備）," gain invaluable insights into fire safety and groundbreaking research from eminent speakers worldwide.

Join us at Fire Asia 2024 to explore the forefront of fire management and emergency preparedness in three transformative days.

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