

Program Guide

The 2026 International Conference on Advanced Technologies for Search & Rescue and Emergency Response Systems (TSE 2026)

November 26 - 28, 2026

Le Quy Don Technical University, Hanoi, Vietnam

Organiser





Le Quy Don Technical University (LQDTU), Hanoi, Vietnam

About TSE 2026

The 2026 International Conference on Advanced Technologies for Search & Rescue and Emergency Response Systems (TSE 2026) provides a forum for exchanging ideas, discussing research results, and presenting cutting-edge innovations at the intersection of science, technology, and emergency management. The conference brings together researchers, engineers, practitioners, policymakers, and industry leaders from around the world to address the increasingly complex challenges of search and rescue operations and emergency response in the modern era. Accepted and presented papers are included in the conference proceedings with ISBN.

Conference Tracks

Track 1: Artificial Intelligence, IoT, and Early Warning Systems

Track 2: Drones, Robotics, and Autonomous Systems for Search and Rescue

Track 3: Command and Control Systems, Communications, and Cybersecurity

Track 4: Search and Rescue Structures and Resilient Infrastructure

Track 5: Simulation Technology, Training, and Digital Exercises

Track 6: Advanced Materials, Equipment, and Innovative Solutions

Track 7: Advanced Technologies for CBRN Response and Environmental Security

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Organising Committee

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Secretary
Thai-Duong Nguyen, LQDTU, Vietnam

Local Information

Hanoi is the antique and dynamic capital of Vietnam. It is the second largest city and also the national hub of commerce, technology science research and culture in Vietnam.

Hanoi is famous for numerous rivers, lakes, and mountains alongside and in the surroundings. It is also well known for typical tropical seasoned place of South East Asia with four seasons: fresh, green and cool in Spring, a bit hot in Summer, fine in Autumn, and cold in Winter.

Hanoi is a harmonious combination of historical, beautiful, and modern landscapes, and friendly residents. In Hanoi, visitors can discover many famous historical sites, e.g., The Literature Temple (a.k.a Van Mieu - Quoc Tu Giam), One-Pillar Pagoda (a.k.a Chua Mot Cot), Lake of Returned Sword (a.k.a Ho Hoan Kiem), Ba Dinh Square, President Ho Chi Minh Mausoleum, etc.

Some typical wonderful places and tours around Hanoi are as follows:

- Halong Bay-on-land and the Citadel (1 day)
- Legendary Hanoi City Tour (1 day)
- Hanoi Art and Craft experience (1 day)
- Fantastic 2 days 1 night Lan Ha Bay Cruise (2 days 1 night)



Temple of Literature



One-Pillar Pagoda



Hoan Kiem Lake (Lake of Returned Sword)



Halong Bay



Ba Dinh Square



Imperial Citadel of Thang Long

Conference Venue: Le Quy Don Technical University

LE QUY DON
TECHNICAL UNIVERSITY

About LQDTU

Le Quy Don Technical University (LQDTU) is one of Vietnam's leading science and technology universities, offering multidisciplinary undergraduate and postgraduate training in engineering and management. LQDTU provides a wide range of highly qualified Bachelor, Master, and Doctoral programs. All academic affairs are led by the Science and Academic Council. Building on our traditions and values over half a century of development, and supported by our highly motivated, intelligent, and enthusiastic academic staff, we ensure that LQDTU is a leading center of knowledge in science and technology, delivering excellence in teaching, learning, and research.

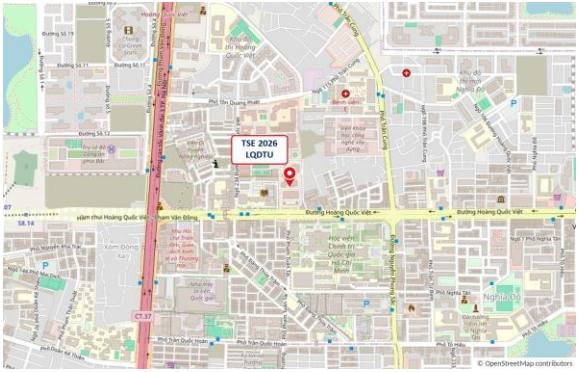
Venue

- **Rooms:** 511 and 507, 5F, S1 building, Area A
- **Address:** 236 Hoang Quoc Viet Street, Nghia Do Ward, Hanoi, Vietnam

Getting there from Noi Bai International Airport (HAN)

- About 25–30 km north of central Hanoi; 35–60 minutes depending on traffic
- Terminal 2 (T2): international flights; Terminal 1 (T1): domestic flights
- Taxi, Grab, airport shuttle/bus, or hotel-arranged transfer





Scan to open in Google Maps

https://maps.app.goo.gl/rzbDn3CdcBrXDMUw6

Conference website: https://tse.lqdtu.edu.vn

Message from the TSE 2026 Chairs

Warmly welcome to the 2026 International Conference on Advanced Technologies for Search & Rescue and Emergency Response Systems (TSE 2026), held at Le Quy Don Technical University (LQDTU), Hanoi, Vietnam, from November 26 to 28, 2026.

Natural disasters, industrial accidents and other emergencies are becoming more frequent and more complex, placing growing demands on the people and the systems that respond to them. TSE 2026 is a multidisciplinary international forum initiated by LQDTU to exchange ideas, discuss research results, share international experience in disaster and emergency response, and present cutting-edge innovations at the intersection of science, technology and emergency management. The conference brings together researchers, engineers, practitioners, policymakers and industry leaders from Vietnam and around the world.

The technical program is organized in seven tracks: Artificial Intelligence, IoT, and Early Warning Systems; Drones Technology, Robotics, and Autonomous Systems for Search and Rescue; Command and Control Systems, Communications, and Cybersecurity; Search and Rescue Structures and Resilient Infrastructure; Simulation Technology, Training, and Digital Exercises; Advanced Materials, Equipment, and Innovative Solutions; and Advanced Technologies for CBRN Response and Environmental Security.

This year's conference attracted strong international participation, with 123 contributing authors from 14 countries and territories across Asia-Pacific (78.0%), Europe, the Middle East, and Africa (11.4%), and the United States (10.6%). While Vietnam represents the largest share of contributors (58.5%), the significant number of submissions led by first authors from the USA, Portugal, Taiwan, Iran, and across the globe underscores the truly international reach and collaborative spirit of this conference. In total, 45 full-paper submissions received 90 peer reviews (an average of 2.0 reviews per paper), and 31 papers were accepted, an acceptance rate of 69%. These papers will be presented in 6 technical sessions, including online presentations, and presented papers are included in the conference proceedings with ISBN.

The conference will feature 6 keynote speeches by distinguished speakers: Assoc. Prof. Nabin Sharma, University of Technology Sydney, Australia (will give talk on AI and Drones for a Safer World); Prof. Masuhiro Beppu, National Defense Academy of Japan (will give talk on a Risk Assessment Method of RC Structures Subjected to Explosive Loads); Dr. Shijia Cao, THHI-GSafety Joint Research Institute, China (will give talk on Resilient Cities in China: From Theory to Practice); Ms. Tatiana Fedoseeva, Bauman Moscow State Technical University, Russia (will give talk on Information Technologies to Reduce Emergency-Related Damage); Prof. Junji Hamada, Kansai University, Japan (will give talk on Rational Seismic Design of Piles Supporting Buildings); and Prof. Nghi H. Tran, The University of Akron, USA (will give talk on Fundamental Limits and Practical Error-Control Codes for Emergency & Mission-Critical Communications). In addition, the program features 2 invited talks by Mr. Sébastien Laurent, Kinéis, France (will give talk on Satellite IoT and Multi-Constellation Geolocation for Search and Rescue) and Assoc. Prof. Anh-Tuan Vu, Le Quy Don Technical University, Vietnam (will give talk on Situation and Prospects of Press-in Technology to Mitigate Disasters in Vietnam).

A conference of this kind cannot be organized without the hard work and dedication of many people. We would like to express our sincere thanks to all authors, keynote speakers, session chairs, committee members, reviewers, volunteers and participants for helping to build this memorable and informative conference.

We hope you all enjoy Hanoi and the TSE 2026 technical program, and find this conference a productive opportunity to explore new ideas, build partnerships, make new friends, and come back to contribute to future TSE conferences.

Steering Co-Chairs: Minh-Thai Le, Anh-My Chu and Xuan-Nam Tran, LQDTU, Vietnam.

General Co-Chairs: Manh-Thang Ha, Quoc-Dinh Nguyen and Duc-Phong Pham, LQDTU, Vietnam.

Technical Program Co-Chairs: Duc-Tang Tran, LQDTU, Vietnam; Xuan-Tung Truong, LQDTU, Vietnam; Tien-Son Bui, HaUI, Vietnam.

Message from LQDTU

Dear distinguished guests, scientists, researchers and colleagues!

First of all, on behalf of Le Quy Don Technical University, I would like to warmly welcome all of you to our university to participate in the 2026 International Conference on Advanced Technologies for Search & Rescue and Emergency Response Systems (TSE 2026). This multidisciplinary international conference, initiated and hosted by our university, is organized not only to serve as a research forum for scientists, engineers and practitioners to introduce new technologies and research achievements, but also to gather international experience in disaster and emergency response and to strengthen collaboration among universities, research institutions, industry and emergency response agencies. I am very happy to know that 31 papers, 6 keynote speeches and 2 invited talks from renowned experts in Vietnam and abroad will be presented at the conference.

Ladies and gentlemen,

Search & rescue and emergency response are among the most demanding missions of our time. Floods, storms, landslides, earthquakes, fires and chemical, biological, radiological and nuclear (CBRN) incidents require rapid, coordinated and reliable responses, in which advanced technologies play an increasingly decisive role. Artificial intelligence, drones and robotics, resilient communications, digital twins, simulation and training systems, advanced materials and protective equipment are opening up new possibilities to save lives and to reduce losses.

As you may have known, Le Quy Don Technical University is among the national-key universities in Viet Nam and one of the national top universities of science and technology. The university offers multidisciplinary undergraduate and postgraduate education in engineering and management. Building on our 60 years of experience in engineering education and research, we are committed to contributing to national search and rescue and emergency response capacity through high-quality education, advanced scientific research, technological innovation and international cooperation.

I do hope that you will enjoy the technical program and find this conference a productive opportunity to explore, exchange ideas, make new friends and, most importantly, build lasting partnerships for future cooperation.

I would like to express my special thanks to all keynote speakers, authors, session chairs, committee members and delegates for your valuable contribution and participation. Finally, I wish you and your families health, happiness and success!

Sincerely!

Prof. Minh-Thai Le
President, Le Quy Don Technical University

Coffee Breaks, Lunches, Conference Banquet and Presentation Guidelines

- **There will be 3 coffee breaks, 1 lunch and 1 conference banquet during the two conference days (November 26th and 27th, 2026) as follows:**
  - Coffee breaks: 09:55 - 10:15 and 15:30 - 15:50 on November 26th; 10:05 - 10:20 on November 27th.
  - Lunch: 12:00 - 13:30 on November 26th.
  - The Conference Banquet will take place on November 26th (18:00 – 21:00) on the 25th floor, S1 Building, Le Quy Don Technical University, 236 Hoang Quoc Viet Street, Nghia Do Ward, Hanoi, Vietnam
- **Conference venue: Rooms 511 and 507, 5F, S1 building, Le Quy Don Technical University, 236 Hoang Quoc Viet str., Nghia Do ward, Hanoi, Vietnam.**
- **Time for presentations:**
  - Keynotes: 30 min for presentation and 5 min for Q&A (Plenary Sessions 1 and 2)
  - Invited talks: 20 min for presentation and 5 min for Q&A (Plenary Sessions 1 and 2)
  - Regular papers: 15 min for presentation and 5 min for Q&A
- **Language: English. Attendance is free of charge (no registration fee).**
- **Notes: Please copy your presentation slides to the laptop in the session room before your session.**

All foreign participants must bring their passports to enter the conference venue. Please enter via Gate A (Hoang Quoc Viet street); the left-side elevator of S1 building is reserved for conference guests.

Program at a Glance: Thursday, November 26, 2026

Time (Hanoi)	Room: 511	Room: 507
08:00 - 08:30	**Registration**	
08:30 - 08:45	**Opening Session** – *Opening speech: Prof. Minh-Thai Le, President of LQDTU*	
08:45 - 11:50	**Plenary Session 1** – *Chairs: Prof. Anh-My Chu, LQDTU & Dr. Trung-Kien Nguyen, LQDTU*	
08:45 - 09:20	**Keynote 1: "From Sharks to Survivors: AI and Drones for a Safer World"** *Assoc. Prof. Nabin Sharma, University of Technology Sydney, Australia*	
09:20 - 09:55	**Keynote 2: "Fundamental Study on a Risk Assessment Method of RC Structures Subjected to Explosive Loads"** *Prof. Beppu Masuhiro, National Defense Academy of Japan, Japan*	
09:55 - 10:15	**Coffee break**	
10:15 - 10:50	**Keynote 3: "Resilient Cities in China: From Theory to Practice"** *Dr. Shijia Cao, THHI-GSafety Joint Research Institute, China*	
10:50 - 11:25	**Keynote 4: "Application of Information Technologies to Improve Emergency Response Efficiency and Reduce Emergency-Related Damage"** *Ms. Tatiana Fedoseeva, Bauman Moscow State Technical University, Russia*	
11:25 - 11:50	**Invited Talk 1: "Search and Rescue Solutions Using Satellite IoT Connectivity and Multi-Constellation Geolocation Technology"** *Mr. Sébastien Laurent, Kinéis, France*	
12:00 - 13:30	**Lunch**	
13:30 - 15:30	**RS1: AI, IoT and Early Warning Systems** (6 papers/120 min)	**RS2&5: Drones, Robotics and Autonomous Systems for Search & Rescue; Simulation Technology, Training and Digital Exercises** (6 papers/120 min)
15:30 - 15:50	**Coffee break**	
15:50 - 17:30	**RS3: Command and Control Systems, Communications and Cybersecurity 1** (5 papers/100 min)	**RS6&7: Advanced Materials, Equipment and Innovative Solutions; Advanced Technologies for CBRN Response and Environmental Security; Online Session** (2 papers + 3 online papers/100 min)
18:00 - 21:00	**Conference Banquet**	

Program at a Glance: Friday, November 27, 2026

Time (Hanoi)	Room: 511	Room: 507
08:00 - 08:30	**Registration**	
08:30 - 10:05	**Plenary Session 2** – *Chairs: Prof. Anh-My Chu, LQDTU & Assoc. Prof. Anh-Tuan Vu, LQDTU*	
08:30 - 09:05	**Keynote 5: "Toward Rational Seismic Design of Piles Supporting Buildings"** *Prof. Junji Hamada, Kansai University, Japan*	
09:05 - 09:40	**Keynote 6: "When Shannon Meets Mayday: Fundamental Limits and Practical Error-Control Codes for Emergency & Mission-Critical Communications"** *Prof. Nghi H. Tran, The University of Akron, USA*	
09:40 - 10:05	**Invited Talk 2: "Situation and Prospects of Press-in Technology to Mitigate Disasters in Vietnam"** *Assoc. Prof. Anh-Tuan Vu, Le Quy Don Technical University, Vietnam*	
10:05 - 10:20	**Coffee break**	
10:20 - 12:00	**RS3: Command and Control Systems, Communications and Cybersecurity 2** (4 papers/80 min)	**RS4: Search and Rescue Structures and Resilient Infrastructure** (5 papers/100 min)

Program at a Glance: Saturday, November 28, 2026

Time (Hanoi)	Activity
08:00 - 18:00	**Exchange and exploration of research cooperation opportunities (LQDTU)**

Keynote Speaker #1

Title: From Sharks to Survivors: AI and Drones for a Safer World



Assoc. Prof. Nabin Sharma, UTS Intelligent Drone Lab, School of Computer Science, University of Technology Sydney (UTS), Australia

Room: 511 - Thursday, November 26th, 08:45 - 09:20

Chairs: Prof. Anh-My Chu, LQDTU & Dr. Trung-Kien Nguyen, LQDTU

Abstract

Drones and artificial intelligence (AI) have revolutionized emergency response and marked the beginning of a new era of life-saving possibilities. Particularly, aerial search and rescue operations for post-disaster management, beach safety, shark detection, to mention a few. In this talk, we will explore how cutting-edge technology is redefining coastal security and emergency response. From real-time beach monitoring and early hazard detection to predicting and mitigating shark encounters, as well as dramatically improving the speed and effectiveness of search and rescue missions. A framework for UAV-based search and rescue will be discussed, along with its successful application in real-world scenarios. In particular, SharkSpotter©, the world's first non-destructive and non-invasive technology for detecting sharks and other potential threats, will be presented. The technology has been used to support lifeguards in challenging environments by providing real-time aerial surveillance, enhancing their capabilities, and enabling rapid responses to potential hazards. The talk will also provide a sneak peek into the next generation of SharkSpotter AI - SharkSpotter 2.0©. In addition, the talk will explore the use of drones and AI for aerial search and rescue and post-disaster management, including rapidly locating survivors and delivering essential supplies to remote or difficult-to-access areas. The Aerial Search and Rescue System (ASARS), developed through the Aus4Innovation program in partnership with UTS and LQDTU, will also be presented as a real-world example of how drones and AI can support search and rescue operations.

Biography

Dr. Nabin Sharma is an Associate Professor and Director of the UTS Intelligent Drone Lab, in the School of Computer Science, University of Technology Sydney (UTS). He is also the Co-director of the UTS-IITM Joint Research Center and the founding course director for the Master and Bachelor of Artificial Intelligence programs at UTS. His research area focuses on computer vision, aerial video and image processing, pattern recognition, deep learning techniques for object detection and recognition, and research translation. Dr. Nabin has more than 19+ years of experience in research & development and academia and received funds exceeding AUD $1.75Million from research grants in collaboration with industry, academia and defense. He has substantial industry experience in software design and development while working on various projects at IBM India Private Ltd. He is the Chief-Investigator and technical lead for several AI-based award-winning industry funded projects at UTS.

Dr. Nabin received several awards at state, national and international level along with his team and industry partners for the research & development and innovative use of AI. Prestigious ones include - National iAwards 2018 by Australian Information Industry Association (AIIA) in the Artificial Intelligence or Machine Learning Innovation of the Year category, merit award at Asia Pacific ICT Alliance Awards (APICTA) 2018 in the Artificial Intelligence Technology of the year category, for the SharkSpotter© project. He served as an organising committee/program committee member for many conferences and serves as a reviewer for prestigious journals and conferences. He is a Senior Member of IEEE, a member of ACM, a member of Australian Water Association, a life-member of the Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI) and a member of the Australia Computer Society (ACS).

Keynote Speaker #2

Title: Fundamental Study on a Risk Assessment Method of RC Structures Subjected to Explosive Loads



Prof. Masuhiro Beppu, National Defense Academy of Japan, Japan

Room: 511 - Thursday, November 26th, 09:20 - 09:55

Chairs: Prof. Anh-My Chu, LQDTU & Dr. Trung-Kien Nguyen, LQDTU

Abstract

This study proposes an evaluating method of the risk of RC structures suffered from explosive loads due to a terrorist's bombing attack, an explosion in a chemical plant and so on. Firstly, a hazard curve that represents the relationship between explosive mass and frequency of the explosive incidents was evaluated based on statistics of terrorist's bombings in the world. Secondly, in order to evaluate damage states of RC structures caused by the explosive loads, fragility curves of RC members, i.e. beam, column, and slab were evaluated by using a single degree of freedom model and rotational capacity based criterion. Herein, the fragility curve shows the relationship between probability of damage levels, such as "no damage", "small damage", "collapse", and explosive mass. Total probability of failure of the RC structure was estimated by superposing the fragility curve of the members. A loss curve was calculated based on the damage states of the RC structure by assuming amount of loss of humans and the RC structure in each damage state. A risk curve was derived by combining the hazard curve with the loss curve.

Biography

Prof. Masuhiro Beppu received BEng and Master degree from National Defense Academy of Japan, and PhD from Yamaguchi University, Japan. Prof. Beppu is currently working at Department of Civil and Environmental Engineering in the National Defense Academy of Japan. His research interests are Protection of Structures against Natural and Manmade Dynamic Loads. Prof. Beppu has been working in the area of Blast and Impact Engineering. He has more than 250 technical publications including over 180 journal papers, 9 edited books, and 80 conference papers. Prof. Beppu was the chairperson of the impact committee in the Japan Society of Civil Engineers. He is the board member of International Association of Protective Structures, associate editor of International Journal of Protective Structures, and serves in the editorial board of many journals.

Keynote Speaker #3

Title: Resilient Cities in China: From Theory to Practice
Dr. Shijia Cao, Assistant Dean, THHI-GSafety Joint Research Institute, China
Room: 511 - Thursday, November 26th, 10:15 - 10:50
Chairs: Prof. Anh-My Chu, LQDTU & Dr. Trung-Kien Nguyen, LQDTU



Abstract

In recent years, building resilient cities has become an important strategic priority in China's efforts to promote high-quality urban development and enhance urban safety and governance capabilities. Beijing was among the first cities in China to incorporate the concept of urban resilience into its master plan, while China's 15th Five-Year Plan has further underscored the strategic importance of resilient city development. As China continues to modernize its urban planning, infrastructure development, and governance systems, significant progress has been made in theoretical research and practical innovation across multiple dimensions of urban resilience. These efforts have generated substantial research outcomes and valuable practical experience.

Drawing on research initiatives and practical projects carried out by GSafety, with support from Tsinghua University, this presentation will highlight representative research findings and engineering applications in resilient city development across China. It will focus on key concepts, implementation approaches, and lessons learned, with the aim of providing valuable insights and practical guidance for cities worldwide seeking to address complex urban risks, strengthen urban resilience, and advance sustainable urban development.

Biography

Dr. Shijia Cao leads the management of scientific and technological innovation at GSafety, overseeing the research, development, and strategic coordination of products and innovative solutions. Dr. Cao has spearheaded multiple research projects under China's National Key Research and Development Program during the 14th Five-Year Plan period. These efforts have received prestigious honors, including the Emergency Management Science and Technology Innovation Award.

Keynote Speaker #4

Title: Application of Information Technologies to Improve Emergency Response Efficiency and Reduce Emergency-Related Damage

Ms. Tatiana Fedoseeva, Bauman Moscow State Technical University, Russia

Room: 511 - Thursday, November 26th, 10:50 - 11:25

Chairs: Prof. Anh-My Chu, LQDTU & Dr. Trung-Kien Nguyen, LQDTU



Abstract

In recent years, ensuring the safety of industrial facilities and protecting the public and territories from natural and man-made threats has become a critical global priority. The use of information technology plays a key role in enhancing the effectiveness of emergency response.

Drawing on research and practical projects carried out by the Research and Educational Center for the study of Extreme Situations at Bauman Moscow State Technical University, this presentation will highlight the development and practical application of hardware-software systems designed to model the consequences of various types of accidents and emergencies. It will also cover the automation of decision-support processes for responding to threats. Special attention will be paid to the transition from responding "after the fact" to preventing accidents. The aim of the report is to share experience and provide practical recommendations for the international community on improving safety and minimizing damage from emergencies.

Biography

Tatiana Fedoseeva is an assistant lecturer at the Department of Ecology and Industrial Safety at Bauman Moscow State Technical University and a lead engineer at the Research and Educational Center for the study of Extreme Situations. Tatiana actively participates in research projects aimed at creating advanced information technologies for industrial safety. She has teaching experience supervising practical laboratory classes for students, focusing on modeling the consequences of incidents and decision-support systems for emergency response.

Keynote Speaker #5

Title: Toward Rational Seismic Design of Piles Supporting Buildings

Prof. Junji Hamada, Department of Architecture, Faculty of Environmental and Urban Engineering, Kansai University, Japan

Room: 511 - Friday, November 27th, 08:30 - 09:05

Chairs: Prof. Anh-My Chu, LQDTU & Assoc. Prof. Anh-Tuan Vu, LQDTU



Abstract

This study proposes a cost-effective and rational seismic design methodology for building piles. Piled raft foundations are highlighted as an efficient system in which frictional resistance at the raft base reduces lateral loads transmitted to piles. Additional technologies that enhance seismic resilience are discussed, including grid-form soil-cement walls and soil-cement retaining walls with H-shaped steels, which divert building inertia forces away from piles. Semi-rigid pile head connections and foundation rotation induced by overturning moments are shown to further reduce pile bending moments. Methods to rationally evaluate building inertial forces, including reducing the contribution of underground structural mass, are also presented.

Biography

Professor Junji Hamada is a Professor in the Department of Architecture at Kansai University, Japan. He holds a Dr.Eng. in Civil Engineering from Tohoku University (2002). Before joining Kansai University in 2026, he spent over 30 years at Takenaka Corporation's R&D Institute, extensively involved in the design, construction, and seismic observation of piled-raft foundations for high-rise buildings. His research focuses on the seismic behavior of building foundations, foundation–soil interaction, and centrifuge model testing. An active member of ISSMGE, JGS, and AIJ, Prof. Hamada is an award-winning researcher (JSCE 2002, JGS 2014) and a frequent international keynote speaker.

Keynote Speaker #6

Title: When Shannon Meets Mayday: Fundamental Limits and Practical Error-Control Codes for Emergency & Mission-Critical Communications



Prof. Nghi H. Tran, Department of Electrical and Computer Engineering, The University of Akron, Akron, USA

Room: 511 - Friday, November 27th, 09:05 - 09:40

Chairs: Prof. Anh-My Chu, LQDTU & Assoc. Prof. Anh-Tuan Vu, LQDTU

Abstract

Over the last few decades, many state-of-the-art techniques have been developed to address the problem of reliable transmissions over communication links. These developments include both information-theoretic studies and explicit channel coding schemes for practical purposes. As a result, effective solutions have been devised, and the results can serve as the fundamental theory and practice behind many modern communication systems. Much of this progress, however, has been driven by applications in which messages are long, and the asymptotic Shannon limit is the natural target. Mission-critical and emergency communications operate under fundamentally different physical constraints. For example, critical telemetry, navigation subframes, and tactical command-and-control are typically only a few tens to hundreds of bits long yet must reach their destination on a single attempt under severe power limits and strict latency constraints. In this short-blocklength regime, classical asymptotic results offer little practical guidance, and many safety-of-life systems in service today still rely on algebraic codes that were designed decades ago and have never been revisited. How far these legacy schemes operate from the fundamental limits imposed by their own packet dimensions, and how much reliability can be recovered by modern code constructions, remain open and practically important questions. This talk provides an overview of the development of channel coding over the past several decades, focusing on how modern short-block constructions and finite-length benchmarks apply to emergency and mission-critical communications. In the first part of the talk, the focus is on Shannon capacity and the evolution of error-control coding from early algebraic block codes to modern capacity-approaching coding schemes. It then examines why the Shannon limit is uninformative for short packets, highlighting finite-blocklength achievability bounds as the proper metric. The second part turns to recent results on short-block code designs for global navigation satellite systems (GNSSs) and tactical data links, where constructions such as shortened CRC-aided polar codes achieve significant coding gains over the legacy schemes while operating within a fraction of a decibel of the finite-blocklength bound. Building upon these short-block designs, the talk then explores machine learning-assisted coding and decoding as an emerging frontier for mission-critical systems, covering both learned code constructions, such as neural developments of polar codes, and code-agnostic neural decoders built on transformer architectures. The latter are especially compelling for mission-critical links: by breaking away from dedicated decoding pipelines, a unified learned architecture can dynamically accommodate varying code rates and formats on the fly, providing powerful error correction for short blocks without inflating hardware footprint.

Keynote Speaker #6 (cont.)

Title: When Shannon Meets Mayday: Fundamental Limits and Practical Error-Control Codes for Emergency & Mission-Critical Communications



Prof. Nghi H. Tran, Department of Electrical and Computer Engineering, The University of Akron, Akron, USA

Room: 511 - Friday, November 27th, 09:05 - 09:40

Chairs: Prof. Anh-My Chu, LQDTU & Assoc. Prof. Anh-Tuan Vu, LQDTU

Biography

Dr. Tran received the BEng degree from Hanoi University of Technology, Vietnam in 2002, the MSc degree (with Graduate Thesis Award) and the PhD degree from the University of Saskatchewan, Canada in 2004 and 2008, respectively, all in Electrical and Computer Engineering. From May 2008 to July 2010, he was at McGill University as a Postdoctoral Scholar under the prestigious Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowship. From August 2010 to July 2011, Dr. Tran was at McGill University as a Research Associate. Since August 2011, Dr. Tran has been with the Department of Electrical and Computer Engineering, The University of Akron (UA), OH, USA where he is currently a Full Professor and the Associate Chair of Graduate Studies. Dr. Tran's research interests span the areas of signal processing, communication and information theories, classical and quantum error-correcting codes, deep learning in physical-layer communications, satellite and space communications, and physical-layer and network security. Dr. Tran has co-authored one book and nearly 200 journal and conference papers. His work has been supported by the Air Force Research Laboratory (AFRL), the US National Science Foundation (NSF), NASA, the Office of Naval Research (ONR), the US Department of Transportation (DoT), and industry. He also works as a consultant in the satellite industry, with recent projects focusing on SATCOM operational resiliency with LinQuest Corporation and OTFS-based waveform design and analysis for covert Doppler-resilient LEO satellite communications with KBR. Dr. Tran has served as an Area Editor (01/2024–Present), Senior Editor (09/2019–12/2023), and Editor (02/2016–08/2019) for IEEE Communications Letters; an Editor for IEEE Transactions on Vehicular Technology (2021–Present); an Editor for IEEE Transactions on Communications (2016–2021); and an Editor for Elsevier Physical Communication (10/2015–12/2021). Dr. Tran has also been a TPC Chair and TPC member for a number of flagship IEEE conferences and workshops, such as IEEE GLOBECOM and IEEE ICC.

Invited Talk #1

Title: Search and Rescue Solutions Using Satellite IoT Connectivity and Multi-Constellation Geolocation Technology

Mr. Sébastien Laurent, Kinéis, France

Room: 511 - Thursday, November 26th, 11:25 - 11:50

Chairs: Prof. Anh-My Chu, LQDTU & Dr. Trung-Kien Nguyen, LQDTU



Abstract

This session examines how satellite IoT and GNSS geolocation technology can support search and rescue operations beyond terrestrial network coverage. Using the Kinéis BIP tracking and SOS device as a reference, it explains how positions acquired via GPS and Galileo are relayed over a resilient satellite network, allowing rescue teams to be located in remote or disaster-affected areas where mobile networks are unavailable.

The talk covers how operating modes balance routine tracking (one position every 15–30 minutes) with high-frequency reporting during emergencies (every 2–5 minutes), how application-level AES-256 encryption and secured data transport protect sensitive location data, and how the data feeds into command-and-control systems to give coordinators near-real-time situational awareness. Typical scenarios, such as operations in mountainous terrain, offshore areas, and wide-area disaster response, illustrate how this approach improves coordination and reduces risk for rescue personnel.

Biography

Sébastien Laurent is an international business executive with over 30 years of experience in telecommunications, technology, corporate finance and M&A. A graduate of the University of Paris-Saclay and Laval University, with executive education from EM Lyon, he held senior leadership roles at Alcatel-Lucent across Europe, Asia and Australia, including CEO of the South Pacific. Since 2012, he has led Alcatel-Lucent and Nokia's operations in Thailand. He is currently active with Global M&A Partners and Financière de Courcelles, serves as Kinéis Representative for APAC since 2025, and was a French Foreign Trade Advisor for Thailand, appointed in 2021.

Invited Talk #2

Title: Situation and Prospects of Press-in Technology to Mitigate Disasters in Vietnam

Assoc. Prof. Anh-Tuan Vu, Le Quy Don Technical University (LQDTU), Vietnam

Room: 511 - Friday, November 27th, 09:40 - 10:05

Chair: Prof. Anh-My Chu, LQDTU



Abstract

Vietnam is one of the most disaster-prone countries in the world, suffering from many different types of natural hazards, including typhoons, floods, droughts, landslides and saltwater intrusion. There are about 5 - 6 typhoons and 2-3 tropical depressions affecting Vietnam every year on average. When typhoons hit land (landfall), they are usually accompanied by high tides and heavy rains, resulting in long and heavy rains, flooding, and landslides. According to the survey results of the Institute of Geosciences and Minerals, there are over 10,000 sites with a high risk of landslides in mountainous areas. Over two thousands eroded riverbank and coastline sites in the country have a total length of over 3,133 km. In the current situation in Vietnam, the Press-in technology has prospects to mitigate disasters. Case studies in Vietnam and other countries are also introduced in the presentation.

Biography

Assoc. Prof. Vu Anh Tuan received his Doctor's degree from Kanazawa University, Japan. He is currently a Senior Lecturer at Le Quy Don Technical University and a standing member of the Executive Committee of the Vietnamese Society of Soil Mechanics and Geotechnical Engineering (VSSMGE), Deputy Secretary-General of VSSMGE. He also serves as a director of the International Press-in Association (IPA) and a nominated member of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE). His research interests focus on geotechnical engineering, particularly pile foundation engineering and the mechanical behaviour of soil and granular materials.

Conference Schedule Details

Room 511 - RS1: Track 1
Artificial Intelligence, IoT, and Early Warning Systems
Chairs: Dr. Quoc-Khanh Nguyen, LQDTU & Assoc. Prof. Van-Giang Nguyen, LQDTU
Thursday, November 26th, 13:30 - 15:30

Time	Title	Authors
13:30	Design and Performance Validation of a 785 nm Raman Spectroscopy System for Non-Invasive Skin Cancer Detection	Hoang Chu Duc, Nguyen Thanh Tung
13:50	Machine Learning for Same-Day Wildfire Risk Screening: A Cross-Region Benchmark of Weather and Fire Weather Index Features	Nguyen Xuan Nam, Pham Vu Minh Tu, Dao Hai Long, Vuong Viet Huy
14:10	Fourier-Enhanced SARIMAX for Ride-Hailing Demand Forecasting	Truong Giang Nguyen, Thi Phuong Nghiem, Giang Son Tran
14:30	Is 94% Tampering-Detection Accuracy Real? Auditing Shortcuts in a Merged Image-Forensics Benchmark for Emergency Operations Centers	Tran Van Triet, Huynh Huu Hung, Huynh Phuong Linh
14:50	Overview of Applied Geophysical Methods in Military Applications	Huong Phan
15:10	Real-Time UAV-Based Human Detection for Search and Rescue: The ASARS System and Field Trials in Vietnam	Truong V. Vu, Nabin Sharma, Thuy T. Pham, Kien T. Nguyen

Conference Schedule Details

Room 507 - RS2&5: Tracks 2 & 5
Drones, Robotics, and Autonomous Systems for Search and Rescue & Simulation Technology, Training, and Digital Exercises
Chairs: Assoc. Prof. Anh-Tuan Nguyen, LQDTU & Dr. Dinh-Quan Nguyen, LQDTU
Thursday, November 26th, 13:30 - 15:30

Time	Title	Authors
13:30	Trustworthy-AI Safety Analysis for Autonomous Smart Systems: Joint Sensing–Braking Degradations in AEB	Govardhan Reddy Kothinti
13:50	Application of Artificial Neural Networks to Controller Machine Learning in Electric Drives	Le Quang Tuyen, Nguyen Dac Nam, Nguyen Duc Toan
14:10	Evidence-Weighted Competency Selection and Training for Human-AI Teaming in Robotic Search-and-Rescue Operations	Andrei Georgievich Somov, Olga Ergunova, Le Quang Minh, Vladimir Pejanović, Pooja Kansra, Natalia Y. Belyakova
14:30	Region Guided Human Detection in UAV Images for Search and Rescue	Nam Anh Bui, Vu Lam Nguyen, Duc Vinh Mai, Duc Manh Nguyen, Van Tien Do, Ngoc Dung Bui
14:50	A Simulation-Based Framework for Multi-Agency Command-and-Control Exercises in Search and Rescue Operations	Kien T. Nguyen, Cong D. Tran, Truong V. Vu
15:10	Development of an Integrated Parachute Simulator for Search and Rescue Training	Kien T. Nguyen, Hai D. Nguyen, Kha M. Pham

Conference Schedule Details

Room 511 - RS3: Track 3
Command and Control Systems, Communications, and Cybersecurity (1)
Chairs: Assoc. Prof. Van-Phuc Hoang, LQDTU & Assoc. Prof. The-Quang Nguyen, LQDTU
Thursday, November 26th, 15:50 - 17:30

Time	Title	Authors
15:50	A Silver-Mesh Dual-Band on-Glass Antenna for Reliable Vehicle Communication in Intelligent Transportation and Emergency Response Systems	Duong Thi Thanh Tu, Do Nguyen Minh Quan, Nguyen Ngoc Huy, Ho Anh Khiem, Nguyen Viet Hung
16:10	Adaptive Secondary Frequency Control of Two-Area Interconnected Power Systems Using SMES and SSSC	Thanh Phong Tran, Thiet Thi Pham
16:30	Cooperative Multi-UAV Quantum Key Distribution over Hybrid FSO/RF Post-Disaster Networks	Minh Tam Phan, Vang Khanh Khuyen, Do Phuc Duy, Hoang Nguyen The, L. H. K. Phuong
16:50	Energy Efficiency Analysis of a Multiple-ARIS-Assisted Aerial-Relay NOMA Network	Ba Cao Nguyen, Van Hau Luu, Jaydeep Bodwadkar, Aditya Kaushik, Xuan Nghia Pham
17:10	Per-Class Decision Weights for Rare Attack Detection With an Edge-Aware GNN: A Post-Hoc Study on TE-G-SAGE	Dang Truong Son, Nguyen Van Thuan, Thanh Lam, Pham Khang Minh, Le Van Tan Phat

Conference Schedule Details

Room 507 – RS6&7: Tracks 6 & 7 and Online Session
Advanced Materials, Equipment, and Innovative Solutions &
Advanced Technologies for CBRN Response and Environmental Security
Chairs: Assoc. Prof. Tien-Anh Nguyen, LQDTU & Assoc. Prof. Van-Chuong Nguyen, LQDTU
Thursday, November 26th, 15:50 - 17:30

Time	Title	Authors
15:50	Integrated UHMWPE and High-Performance Fiber Composite Technologies for Lightweight Ballistic Protection	Hsing-Hsun Lee
16:10	A Diagnostic Extension for Near-Ground Dense-Gas Effects in GRAMM/GRAL: Preliminary Evaluation With Thorney Island Trial 008	Jiale Zhang, Yang Yu, Yudie Jianyao, Qiang Dong, Yuheng Cheng, Xiaole Zhang
16:30 *Online*	A Proof-of-Concept AI-Enabled Digital Twin Framework for Multi-Hazard Early Warning and Emergency Decision Support in Smart University Campuses	Nguyen Duc Thanh, Nguyen Thi To Lan
16:50 *Online*	IoT Wearables and Immersive VR Simulation for Emergency	Nguyen Thi To Lan, Nguyen Duc Thanh
17:10 *Online*	A Decision-Support Framework for Resilient Municipal Energy Infrastructure: Integrating Public Hospitals, Primary Care and Emergency Services in Lisbon	Nuno Soares Domingues

Conference Schedule Details

Room 511 – RS3: Track 3
Command and Control Systems, Communications, and Cybersecurity (2)
Chairs: Assoc. Prof. Van-Phuc Hoang, LQDTU & Assoc. Prof. The-Quang Nguyen, LQDTU
Friday, November 27th, 10:20 - 12:00

Time	Title	Authors
10:20	Privacy-Preserving Nearest-Station Selection for Search and Rescue and Emergency Response	Minh Thien Long Vo, Minh Vuong Long Vo
10:40	Revisiting Similarity-Graph GraphSAGE for IoT Intrusion Detection on NF-ToN-IoT	Van Thuan Nguyen, Thanh Van Tong, Thi Bich Nguyen Nguyen, Khang Minh Pham, Van Tan Phat Le
11:00	Secrecy Performance of Hardware-Impaired Aerial Reconfigurable Intelligent Surface-Assisted Communications	Dinh Tan Tran, Ba Cao Nguyen, Van Hau Luu, Bui Trong Hoang, Xuan Nghia Pham, Xuan Nam Tran
11:20	Tail-Biting Convolutional Codes for Link 16 in Emergency-Response Communications: Approaching Finite-Blocklength Limits	Nuwan Janaranga Galabada Kankanamge, Gabriel Glor, Minh-Duc Doan, Nghi H. Tran

Conference Schedule Details

Room 507 – RS4: Track 4
Search and Rescue Structures and Resilient Infrastructure
Chairs: Assoc. Prof. Anh-Tuan Vu, LQDTU & Prof. Junji Hamada, Kansai University
Friday, November 27th, 10:20 - 12:00

Time	Title	Authors
10:20	Adaptive Integral Sliding Mode Control for Resilient Frequency Regulation of Wind-Integrated Interconnected Power Systems	Phong Thanh Tran, Tuan Van Huynh, Phuc Thien Nguyen
10:40	Amphibious Urbanisms: Spatial Stratigraphy Analysis and Morphological Pathologies Across Three Vietnamese Water Systems	Ha Huy Thach, Le Nguyen Viet Lan
11:00	An Optimal Route-Finding Approach Using Terrain Cost Models and the Dijkstra Algorithm	Dinh Sinh Mai, Duong Duc Kien, Le Nhu The, Nguyen Thi Thu Nga
11:20	Seepage Control of River Levees Using Sheet Piles Installed by the Press-in Piling Method	Tsunenobu Nozaki
11:40	Toward Rational Seismic Design of Piles Supporting Buildings	Junji Hamada

Notes

TSE 2026

The 2026 International Conference on Advanced Technologies for Search & Rescue and Emergency Response Systems

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