VEH 2025

The 6th International Conference on Vibration and Energy Harvesting Applications

11-14 JULY | Hong Kong

Conference Handbook

Welcome

On behalf of the Organizing Committee, it is our great pleasure to extend a warm welcome to all participants attending the 6th International Conference on Vibration and Energy Harvesting Applications (VEH2025), which will be held from July 11 to 14, 2025, at the Clear Water Bay campus of Hong Kong University of Science and Technology, Hong Kong, China.

Vibration energy harvesting technology is an interdisciplinary field and has attracted significant attention from both academia and industry toward green and renewable energy and self-powered systems over the past decade. VEH 2025 aims to provide an international platform for researchers from all over the world to exchange ideas to advance the development of the related technologies. All innovative research works related to vibration analysis, energy harvesting, their applications, and results on the mechanical design, optimization, dynamics, power management circuits and systems, MEMS technology, nano technology, new materials, self-powered IoT applications, and other related areas are welcome.

Hong Kong is a world-renowned international metropolis, seamlessly blending rich traditions with cutting-edge innovation. As a global financial hub, the city is also making strides in sustainability and smart-city initiatives, particularly in energy efficiency and green technologies. Attending VEH 2025 in Hong Kong will not only give you the opportunity to engage with leading experts in vibration and energy harvesting but also to explore the city's advanced research facilities and innovation ecosystem.

Zhengbao Yang
Chair of VEH 2025

Content

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The Global Engagement and Greater China Affairs Unit spearheads our efforts in fostering global connections and collaborations;

The Public Affairs and Communications Unit brings together the Brand Marketing, Media, and PR and Communications and Content teams, working in synergy under the leadership of the Director of Public Affairs and Communications to craft compelling narratives and promote HKUST's brand worldwide;

The Events and Community Outreach Team oversees the organization of engagement initiatives which encourage the University’s exchange and stronger bonding with diverse communities.

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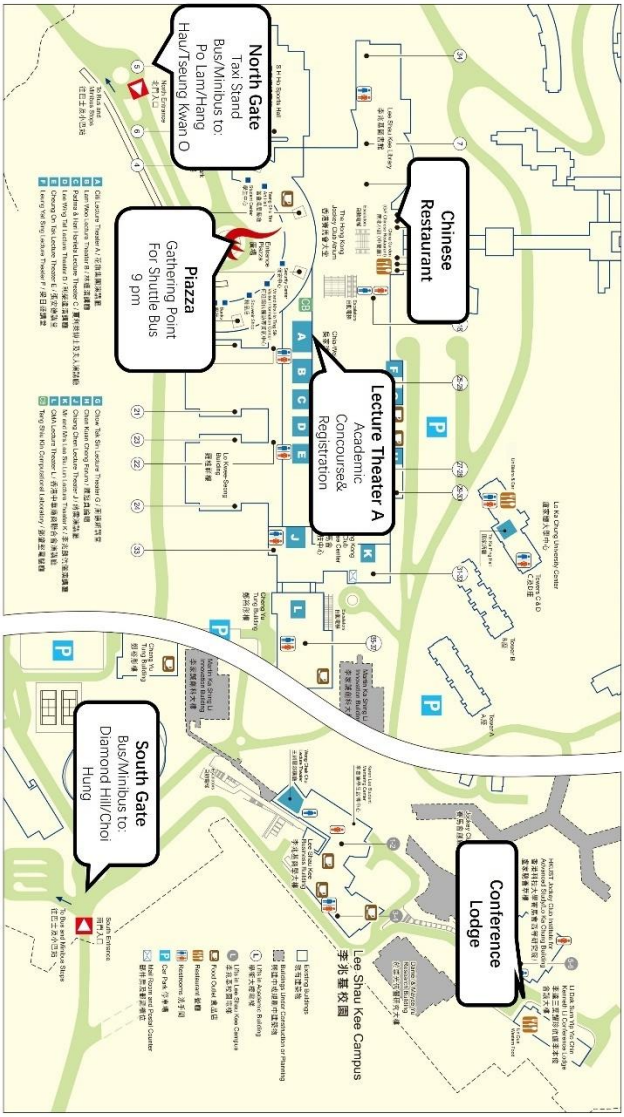
Conference Venue

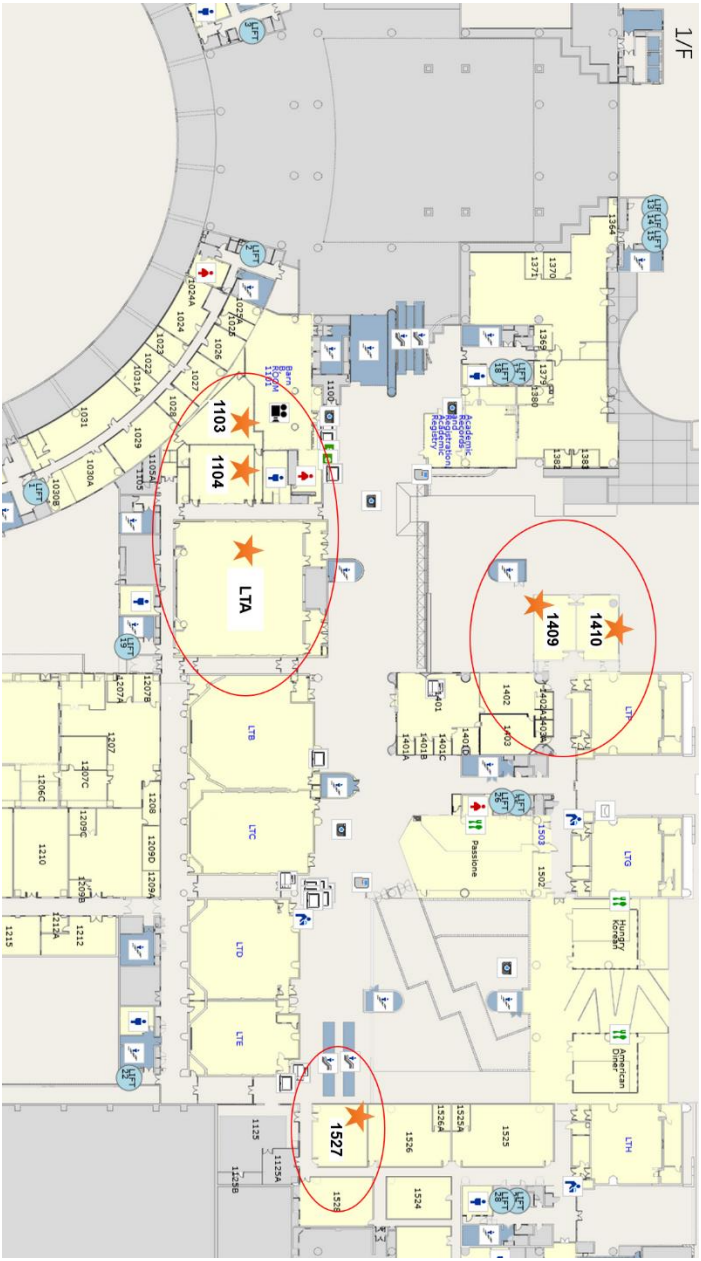
The conference will be held at The Hong Kong University of Science and Technology (HKUST).



Lecture Theaters and Lift Location

The Hong Kong University of Science and Technology

1/F Academic Concourse and Parallel Sessions (Five-pointed star)



Program Overview

Date	Time	Schedule					
11-Jul-25	15:00-18:00	**Registration**					
	18:00-20:00	**VEH committee dinner and meeting**					
12-Jul-25	8:20-8:40	**Opening ceremony& Group Photo**				Venue: **LTA** Chair: **Prof. Zhengbao Yang**	
	8:40-9:20	**Plenary:** **Vibration and Morphing Aircraft** **Prof. Daniel Inman**, University of Michigan, The United States				Venue: **LTA** Chair: **Prof. Jinsong Leng**	
	9:20-10:00	**Plenary:** **Smart structures and 4D printing: from aerospace to biomedical applications** **Prof. Jinsong Leng**, Harbin Institute of Technology, China				Venue: **LTA** Chair: **Prof. Daniel Inman**	
	10:00-10:20	**Coffee Break & Lion Dance Performance (Location: Out of LTA)**					
	10:20-12:00	**Session 1-1:** Artificial Intelligence (AI) Driven Self-powered Sensing **Room: LTA**	**Session 1-2:** Artificial Intelligence (AI) Driven Self-powered Sensing **Room: 1103**	**Session 2:** Water Energy Harvesting **Room: 1104**	**Session 4:** Energy harvesting based self-powered sensing **Room: 1409**	**Session 13:** Energy Conversion and Storage Materials **Room: 1410**	**Session 5-1:** Flow-induced vibration energy harvesting **Room: 1527**
	12:00-13:00	**Lunch Time**					
	13:00-15:00	**Session 7:** Applications of Energy Harvesting in Advancing AIoT **Room: LTA**	**Session 3-1:** Rotational energy harvesting **Room: 1103**	**Session 6-1:** Energy harvesting and self-powered wearable systems **Room: 1104**	**Session 9:** Nonlinear vibrations and data-driven methods **Room: 1409**	**Session 10:** Materials and devices for vibration-based energy **Room: 1410**	**Session 11:** Marine Renewable Energy Harvesting **Room: 1527**
	15:00-15:30	**Coffee Break & Poster Viewing (Location: Out of LTA)**					
	15:30-18:00	**Session 14-1:** Weak Energy Harvesting and Self-Powered Sensing **Room: LTA**	**Session 8-1:** Energy Harvesting Applications of Metamaterials and Phononic Crystals **Room: 1103**	**Session 14-2:** Weak Energy Harvesting and Self-Powered Sensing **Room: 1104**	**Session 16-1:** Transfer, conversion and storage of thermal energy **Room: 1409**	**Session 12:** Hybrid Energy Harvesting and Intelligent Sensing **Room: 1410**	**Session 5-2:** Flow-induced vibration energy harvesting **Room: 1527**
	18:00-21:00	**Conference Banquet**					

Date	Time	Schedule				
13-Jul-25	9:00-9:40	**Plenary:** **Triboelectric nanogenerators (TENG) for sustainable energy and systems** **Prof. Zhong Lin Wang**, Beijing Institute of Nanoenergy and Nanosystems, CAS, China				Venue: **LTA** Chair: **Prof. Jean Zu**
	9:40-10:20	**Plenary:** **Design and development of nonlinear Piezoelectric energy harvesters** **Prof. Jean Zu**, Stevens Institute of Technology, The United States				Venue: **LTA** Chair: **Prof. Zhong Lin Wang**
	10:20-10:40	**Coffee Break (Location: Out of LTA)**				
	10:40-12:00	**Session 15-1:** Nonlinear Dynamics in Energy Harvesting **Room:LTA**	**Session 17:** Spacecraft Vibration and Energy Harvesting **Room: 1103**	**Session 3-2:** Rotational energy harvesting **Room:1104**	**Session 6-2:** Energy harvesting and self-powered wearable systems **Room: 1409**	**Session 16-2:** Transfer, conversion and storage of thermal energy **Room:1410**
	12:00-13:00	**Lunch Time**				
	13:00-15:00	**Session 15-2:** Nonlinear Dynamics in Energy Harvesting **Room: LTA**	**Session 18:** Structural Dynamics and Control **Room: 1103**	**Session 16-3:** Transfer, conversion and storage of thermal energy **Room:1104**	**Session 16-4:** Transfer, conversion and storage of thermal energy **Room: 1409**	**Session 8-2:** Energy Harvesting Applications of Metamaterials and Phononic Crystals **Room:1410**
	15:00-15:30	**Coffee Break (Location: Out of LTA)**				
	15:30-16:00	**Award Ceremony (Location: LTA)**				
	18:00-21:00	**Keynote gathering**				
14-Jul-25	9:00-17:00	**Technical visit and excursion**				

Date: Jul 12 (Saturday) Morning

Session 1-1: Artificial Intelligence (AI) Driven Self-powered Sensing
Venue: LTA
Chairs: Prof. Xutao Mei, Harbin Institute of Technology
Prof. Jianpin Guo, Sun Yat-Sen University
Prof. Junrui Liang, Shanghai Tech University

Time	No.	Activity	Speaker	Title
10:20-10:50		Keynote	**Sang-Woo Kim** Yonsei University	Triboelectric Energy Harvesting for Self-Sustained Therapeutic Systems
10:50-11:20	254	Keynote	**Chengkuo Lee** National University of Singapore	Progress in Self-Powered Sensors – From Wearables to Agriculture
11:20-11:35	94	Oral	**Jintao Meng** ShanghaiTech University	ViPSN-lable: Self-powered Bluetooth E-ink Lable -- Design and Implementation
11:35-11:50	173	Oral	**Mianxin Xiao** Xidian University	Battery-free camera based on EMG vibration energy supply
11:50-12:05	36	Oral	**Yilong Wang** Harbin Institute of Technology	Mutualistic Symbiotic Wireless Node for Next-Era Smart Transportation

Session 1-2: Artificial Intelligence (AI) Driven Self-powered Sensing
Venue: Room 1103
Chairs: Prof. Lei Hou, Harbin Institute of Technology
Prof. Yilong Wang, Harbin Institute of Technology

Time	No.	Activity	Speaker	Title
10:20-10:50	4	Keynote	**Jae Yeong Park** Kwangwoon University	Vibration-Driven Hybrid Energy Harvesting Technologies for Self-Sustainable Smart IoT Systems
10:50-11:05	118	Oral	**Shengqi Gao** ShanghaiTech University	Self-Powered Floor Tile for Detecting Step Arrival and Departure
11:05-11:20	157	Oral	**Yuteng Cao** Beijing Information Science and Technology University	Nonlinear dynamical analysis for the tri-stable energy harvester system
11:20-11:35	24	Oral	**Manjuan Huang** Soochow University	IoT-Enabled Self-Powered Wireless Sensor Nodes for Fault Detection through Vibration Analysis

Date: Jul 12 (Saturday) Morning

Session 2: Water Energy Harvesting
Venue: Room 1104
Chairs: Prof. Dong-Myeong Shin, The University of Hong Kong
Prof. Changsoon Choi, Hanyang University

Time	No.	Activity	Speaker	Title
10:20-10:50		Keynote	**Zuankai Wang** The Hong Kong Polytechnic University	Field matching principle for energy efficiency enhancement
10:50-11:05	124	Invited	**Hong-Joon Yoon** Gachon University	Triboelectric Nanogenerators for Ultrasound-Driven Wireless Power Transfer via Acoustic Impedance Engineering
11:05-11:20	61	Invited	**Hanjun Ryu** Chung-Ang University	Highly compact triboelectric nanogenerators for sustainable energy solutions
11:20-11:35	195	Invited	**Tae Gwang Yun** Ajou University	Transpiration driven electrokinetic power generator
11:35-11:50	21	Oral	**Yuqi Chen** Huazhong University of Science and Technology	Exploring the energy characteristic dynamic of time-varying vibration energy by dynamic amplitude-frequency using a rotational vector
11:50-12:05	29	Oral	**Yunfei Li** Harbin Institute of Technology	Non-Contact Magnetic Frequency-Boosting Wind Energy Harvester and Self-Sensing System

Session 4: Energy harvesting-based self-powered sensing
Venue: Room 1409
Chairs: Prof. Weiqun Liu, Southwest Jiaotong University
Prof. Jiawen Xu, Southeast University
Prof. Yipeng Wu, Nanjing University of Aeronautics & Astronautics

Time	No.	Activity	Speaker	Title
10:20-10:50	71	Keynote	**Chris Bowen** University of Bath	Processing of Smart Porous Electro-Ceramic Transducers (ProSPECT)
10:50-11:05	181	Invited	**Kangqi Fan** Xidian University	A high-performance vibration energy modulator with automatic energy accumulation-discharge strategy for low frequency energy harvesting
11:05-11:20	114	Oral	**Xingchen Ma** Tongji University	Biodegradable and Transparent Soft Piezoelectret Film with a Shuttle-Shaped Air Cell for Sustainable Bioelectronics
11:20-11:35	86	Invited	**Elena Atroshchenko** University of New South Wales	An Analog Computing Approach to Bearing Fault Diagnosis Using Energy Harvested by a Piezo-electric System

Date: Jul 12 (Saturday) Morning

Session 13: Energy Conversion and Storage Materials
Venue: Room 1410
Chairs: Prof. Huliang Dai, Huazhong University of Science and Technology
Prof. Lanbin Zhang, China University of Geosciences (Wuhan)
Prof. Lin Wang, Huazhong University of Science and Technology

Time	No.	Activity	Speaker	Title
10:20-10:50	207	Keynote	**Shujun Zhang** University of Wollongong	Dielectric energy storage MLCC
10:50-11:05	141	Oral	**Yubao Li** Guizhou University	Design and Power Management Optimization of Variable-Distance Bidirectional Wind Energy Harvesting System Based on Triboelectric-Electromagnetic Hybrid Generation
11:05-11:20	90	Oral	**Jiaxin Peng** Hebei University of Technology	Ionic hydrogel for efficient moisture energy harvesting
11:20-11:35	5	Oral	**Chung Ket Thein** University of Nottingham Ningbo China	A Novel Combination Method for Electromagnetic Energy Harvesting Paver Array Using Mechanical Switches
11:35-11:50	184	Oral	**Ye Xu** Mid Sweden University	Comparison and optimization of magnet configurations in m-shaped variable reluctance energy harvester

Session 5-1: Flow-induced vibration energy harvesting
Venue: Room 1527
Chairs: Prof. Junlei Wang, Zhengzhou University
Prof. Wan Sun, Jiangsu University

Time	No.	Activity	Speaker	Title
10:20-10:50		Keynote	**Jinhao Qiu** Nanjing University of Aeronautics and Astronautics	Application of Acoustic Black Holes in Vibration and Noise Reduction
10:50-11:05	73	Oral	**Mingjie Guan** Xiamen University of Technology	Study on an inertial electromagnetic energy harvester excited by flow induced motion in low-speed water
10:05-11:20	196	Oral	**Hao Tang** The Hong Kong University of Science and Technology (Guangzhou)	Design, analysis, and implementation of bias-flip synchronized switch damping technique for enhanced and adaptive vibration attenuation
11:20-11:35	198	Oral	**Cuipeng Xia** The University of Auckland	A multi-directional and multi-modal galloping piezoelectric energy harvester with v-shaped beam
11:35-11:50	33	Oral	**Haigang Tian** Zhengzhou University	Dumbbell-shaped piezoelectric energy harvesting from vortex-induced vibrations and galloping
11:50-12:05	27	Oral	**Tianyi Tang** Harbin Institute of Technology	High-Power Mag-Boost Mechanism for Ocean Wave Energy Harvesting

Date: Jul 12 (Saturday) Afternoon

Session 7: Applications of Energy Harvesting in Advancing AIoT
Venue: LTA
Chairs: Prof. Xin Li, Xidian University
Prof. Guobiao Hu, The Hong Kong University of Science and Technology (Guangzhou)
Prof. Chunbo Lan, Nanjing University of Aeronautics and Astronautics
Prof. Jiawen Xu, Southeast University

Time	No.	Activity	Speaker	Title
13:00-13:30	238	Keynote	**Yuji Suzuki** The University of Tokyo	Stretchable Fluorinated Elastomer Electret for Powering Skin Electronics
13:30-13:45		Invited	**Xin Li** Xidian University	Transient-motion-powered Fingertip Interaction Game
13:45-14:00	103	Oral	**Yingyu Hua** The hong kong polytechnic university	Model-predictive-control-based self-powered active secondary lateral suspension of high-speed trains using electromagnetic dampers with vibration control and energy harvesting functions
14:00-14:15	72	Oral	**Lichang Qin** Tsinghua University	In-situ self-powered sensing and active control of the magnetorheological damper for aero-engines.
14:15-14:30	37	Oral	**Junchao Zhuo** Southwest Jiaotong University	Self-adaptive Energy-autonomous Integrated System for Full-wave Acceleration Measurement with Single Multi-function Transducer
14:30-14:45		Oral	**Bo Qian** Southwest Jiaotong University	Sensorless and universal frequency-tuning interface for piezoelectric generators by large-step MPPT method

Date: Jul 12 (Saturday) Afternoon

Session 3-1: Rotational energy harvesting
Venue: Room 1103
Chairs: Prof. Hailing Fu, Beijing Institute of Technology
Prof. Xutao Mei, Harbin Institute of Technology

Time	No.	Activity	Speaker	Title
13:00-13:30	22	Keynote	**Shengxi Zhou** Northwestern Polytechnical University	Mechanical energy harvesters for rail transit infrastructure: Design, modeling and experiments
13:30-13:45		Invited	**Huicong Liu** Soochow University	Environmental Energy Harvesting Technology Based on High-Efficient Rotational Mag-Boost Mechanism
13:45-14:00		Invited	**Ye Xu** Mid Sweden University	Exploring in Variable Reluctance Energy Harvesting for Self-Powered Sensing in Rotating Machinery
14:00-14:15		Invited	**Huifang Liu** Shenyang University of Technology	Research on laser fabrication method of flexible coils for magnetostrictive nanogenerators and its mechanical-magnetic-electric coupling characteristics
14:15-14:30	66	Invited	**Wei Wang** Zhengzhou University	Energy harvesting from omnidirectional in-plane vibration through magnetic rolling pendulums
14:30-14:45	55	Oral	**Xiaoqing Ma** Zhengzhou University	Nonlinear analysis and response identification of nonlinear wind-induced vibration energy harvesters
14:45-15:00	45	Oral	**Zhiyuan Li** The Hong Kong Polytechnic University	Chaotic Response of a Tristable Flutter-Based Energy Harvester
15:00-15:15	120	Oral	**Luyao Zhao** Shenyang University of Technology	Manufacturing, Characteristic Analysis and Actuation Application of Flexible Magnetostrictive Fiber Ribbon Film

Date: Jul 12 (Saturday) Afternoon

Session 6-1: Energy harvesting and self-powered wearable systems
Venue: Room 1104
Chairs: Prof. Linchuan Zhao, Shanghai Jiao Tong University
Prof. Wenbin Kang, City University of Hong Kong

Time	No.	Activity	Speaker	Title
13:00-13:30		Keynote	**Wenming Zhang** Shanghai Jiao Tong University	Mechanical intelligence for biomechanical energy harvesting systems: Design methodology and applications
13:30-13:45		Inivted	**Ying Zhang** Xi'an Jiaotong University	Variable Reluctance Energy Harvesting for Torque Monitoring of Rotating Shafts
13:45-14:00		Inivted	**Linchuan Zhao** Shanghai Jiao Tong University	Adaptive underwater biomechanical energy harvesting belt
14:00-14:15	40	Oral	**Quan Bai** Hunan Institute of Engineering	A triboelectric nanogenerator with buckling structure and antimagnetic pole mechanism for wind energy harvesting
14:15-14:30	148	Oral	**Jinyan Feng** Guizhou University	A self-powered intelligent wireless mouse based on multi-source micro energy harvesting
14:30-14:45	125	Oral	**Zehao Hou** Xidian University	Biomechanical modeling and experiments of energy harvesting backpacks
14:45-15:00		Oral	**Hongcheng Qiu** Shanghai Jiao Tong University	A self-powered SICE circuit for piezoelectric energy capturing with a complete charge extraction electronic breaker
15:00-15:10		Oral	**Qitao Lu** The Chinese University of Hong Kong	Biological Grooming Behavior Inspired Wristband Energy Harvester

Date: Jul 12 (Saturday) Afternoon

Session 9: Nonlinear vibrations and data-driven methods
Venue: Room 1409
Chairs: Prof. Xiuting Sun, Tongji University
Prof. Bo Yan, Zhejiang Sci-Tech University

Time	No.	Activity	Speaker	Title
13:00-13:30		Keynote	**Grzegorz Litak** Lublin University of Technology	Nonlinear Effects in Energy Vibration Harvesting
13:30-13:45	136	Oral	**Chengjia Sun** Beijing Institute of Technology	High-Dimensional Stochastic Dynamics Analysis of Hybrid Energy Harvesters
13:45-14:00		Oral	**Yu Cai** Hangzhou Dianzi University	Design and Analysis of a compact Quasi-Zero Stiffness Electromagnetic Energy Harvester for Low-Frequency Vibration
14:00-14:15	143	Oral	**Muxuan Guo** The University of Auckland	Vibration Suppression Performance of Parallel Asymmetric Nonlinear Energy Sinks under Impulse Excitation
14:15-14:30	170	Oral	**Xin Lan** Harbin Institute of Technology	Research on Active Vibration Control Based on Piezoelectric Smart Materials
14:30-14:45	109	Oral	**Yi Wu** The University of Auckland	Kresling Origami-Inspired Nonlinear Vibration Absorber with Quasi-Zero Stiffness
14:45-15:00	99	Oral	**Zhongsheng Chen** Shandong Xiehe University	Multi-objective H∞ optimization method for synchronous vibration isolation and energy harvesting

Date: Jul 12 (Saturday) Afternoon

Session 10: Materials and devices for vibration-based energy harvesting and sensing applications
Venue: Room 1410
Chairs: Prof. Yan Zhang, Central South University
Prof. Yaojin Wang, Nanjing University of Science and Technology
Prof. Ya Yang, Beijing Institute of Nanoenergy and Nanosystems
Prof. Guangzu Zhang, Huazhong University of Science and Technology

Time	No.	Activity	Speaker	Title
13:00-13:30	221	Keynote	**Renyun Zhang** Mid Sweden University	Cellulose materials for triboelectric energy harvesting: from fundamental to engineering
13:30-13:45	163	Invited	**Ya Yang** Beijing Institute of Nanoenergy and Nanosystems	Hybridized and coupled Nanogenerators
13:45-14:00	41	Invited	**Yan Zhang** Central South University	Flexible piezoelectric composite with highly stretchable capability and improved output for smart applications
14:00-14:15	134	Invited	**Shiyuan Liu** The Hong Kong Unviersity of Science and Technology	Capillary-Assisted Assembly of Piezoceramic Materials
14:15-14:30	47	Oral	**Shuo Deng** Wuhan University of Technology	Intermittently Contacted Dynamic Semiconductor Junction
14:30-14:45	188	Oral	**Guocheng Wang** Tsinghua University	A Flexible Piezoelectret Sensor for High-Sensitivity Crack Monitoring
14:45-15:00	105	Oral	**Zilin Li** Zhengzhou University	Self-Powered Stick-Slip State Recognition Sensor Based on Triboelectric-Electromagnetic Mechanism

Date: Jul 12 (Saturday) Afternoon

Session 11: Marine Renewable Energy Harvesting
Venue: Room 1527
Chairs: Prof. Xiaofan Li, The University of Hong Kong
Prof. Zhenhua Wei, Southern University of Science and Technology
Prof. Binrong Wen, Shanghai Jiao Tong University

Time	No.	Activity	Speaker	Title
13:00-13:15	95	Invited	**Xiaofan Li** The University of Hong Kong	A physics-informed neural network for fluid-structure coupled simulation of a Euler-Bernoulli beam under steady flow
13:15-13:30	172	Invited	**Zhenhua Wei** Southern University of Science and Technology	Predicting the performance of chemical admixtures using sparse machine learning
13:30-13:45	244	Oral	**Renwen Liu** Hefei University of Technology	Enhancement wave energy harvesting through a piezoelectric energy harvester based on C-shaped cantilever beams and pendulum excitation
13:45-14:00	222	Oral	**Ben Wilks** University of Newcastle	Ocean wave energy harvesting by a rectangular piezoelectric plate
14:00-14:15	192	Oral	**Jiawen Xu** Southeast University	Conv-Transformer based few-shot learning for high accurate multiple task structural health monitoring via piezoelectric impedance

Session 14-1: Weak Energy Harvesting and Self-Powered Sensing
Venue: LTA
Chairs: Prof. Chi Zhang, Beijing Institute of Nanoenergy and Nanosystems
Prof. Zhaoye Qin, Tsinghua University

Time	No.	Activity	Speaker	Title
15:30-16:00		Keynote	**Meiling Zhu** University of Exeter	Smart Rail Track Monitoring Enabled by Energy Harvesting
16:00-16:15	65	Invited	**Chi Zhang** Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences	Triboelectric Nanogenerators for Weak Mechanical Energy Harvesting and Self-Powered Microsystems
16:15-16:30	7	Oral	**Hao Wu** South China University of Technology	Transistor-inspired energy harvesters
16:30-16:45	67	Oral	**Xuanyu Huang** Tsinghua University	Self-powered system based on Structural superlubricity
16:45-17:00	445	Oral	**Yaokun Pang** Qingdao University	Marine polysaccharides-based high performance triboelectric nanogenerator
17:00-17:15	77	Oral	**Ru Guo** The Chinese University of Hong Kong	Boosting the maximized output energy density of triboelectric nanogenerators

Date: Jul 12 (Saturday) Afternoon

Session 8-1: Energy Harvesting Applications of Metamaterials and Phononic Crystals
Venue: Room 1103
Chairs: Prof. Guobiao Hu, The Hong Kong University of Science and Technology (Guangzhou)
Prof. Bao Zhao, Hong Kong Polytechnic University

Time	No.	Activity	Speaker	Title
15:30-16:00	12	Keynote	**C.W. Lim** City University of Hong Kong	Voltage Controlled Topologically Protected Wave Propagation in Dielectric Membrane-type Acoustic Metamaterials
16:00-16:15	75	Invited	**Tianxue Ma** Beijing Jiaotong University	Piezoelectric Energy Harvesting of Airborne Sounds via Edge and Bulk States in Phononic Crystal Cavity Chains
16:15-16:30	102	Oral	**Yupei Jian** Southwest Jiaotong University	Piezoelectric Metamaterials with Multiple Defect Modes Enabled by High-Order Resonant Circuits
16:30-16:45	106	Oral	**Xiaolei Tang** Tianjin University	Topological rainbow trapping and energy amplification of waterborne acoustic waves within gradient phononic crystals

Session 14-2: Weak Energy Harvesting and Self-Powered Sensing
Venue: Room 1104
Chairs: Prof. Yunlong Zi, The Hong Kong University of Science and Technology (Guangzhou)
Prof. Shiyuan Liu, The Hong Kong University of Science and Technology (Guangzhou)

Time	No.	Activity	Speaker	Title
15:30-16:00		Keynote	**Yunlong Zi** The Hong Kong University of Science and Technology (Guangzhou)	Tribo-induced Wireless Sensing, Visualized Sensing, and Tactile Sensing toward Embodied Intelligence
16:00-16:15		Invited	**Jiajia Shao** Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences	Theoretical models for triboelectric and tribovoltaic nanogenerator
16:15-16:30	63	Oral	**Fengyi Chen** The Hong Kong University of Science and Technology (Guangzhou)	Self-powered wireless oil quality sensing system based on triboelectric-discharge effect
16:30-16:45	251	Oral	**Dongyang Hu** Hunan University	An ultrahigh performance electric-field and vibration hybrid energy harvester leveraging the induced charge excitation strategy
16:45-17:00	144	Oral	**Donglin Hu** The Hong Kong University of Science and Technology (Guang Zhou)	Bio-Inspired Nanopillar Triboelectric Acoustic Sensor via Machine Learning-Enhanced Speech Recognition for Wearable Throat Vibration Monitoring
17:00-17:15		Oral	**Keping Wang** North University of China	A Flexible Arrayed MWNT/PVDF Electrospun Membrane-based Triboelectric Nanogenerator for Pressure Sensing

Date: Jul 12 (Saturday) Afternoon

Session 16-1: Transfer, conversion and storage of thermal energy
Venue: Room 1409
Chairs: Prof. Yanguang Zhou, The Hong Kong University of Science and Technology
Prof. Qingping Sun, The Hong Kong University of Science and Technology

Time	No.	Activity	Speaker	Title
15:30-16:00		Keynote	**Qingping Sun** Hong Kong University of Science and Technology	Energy Harvesting and Heat Transfer Process in Green Refrigeration using Latent Heat of Shape Memory Alloys
16:00-16:15	243	Invited	**Aoran Fan** Tsinghua University	Interface detection and optimization of all-solid-state lithium battery
16:15-16:30	237	Invited	**Yufei Gao** Dalian University of Technology	Multi Effect of Grain Boundary on the Thermal Transport in Nanomaterials
16:30-16:45		Invited	**Chao Fang** The Hong Kong University of Science and Technology (Guangzhou)	Boosting Thermogalvanic Hydrogel Electrolytes via ML-driven Solvation Engineering
16:45-17:00	203	Oral	**Chunye Ma** Hong Kong University of Science and Technology	Microscopic kinetics of atmospheric water sorption in metal-organic frameworks
17:00-17:15	161	Oral	**Qinqin He** Hong Kong University of Science and Technology	Revisit the intrinsic anharmonicity in hybrid perovskites

Date: Jul 12 (Saturday) Afternoon

Session 12: Hybrid Energy Harvesting and Intelligent Sensing
Venue: Room 1410
Chairs: Prof. Shitong Fang, Shenzhen University
Prof. Zhihui Lai, Sun Shenzhen University
Prof. Mingjing Cai, Xidian University

Time	No.	Activity	Speaker	Title
15:30-16:00		Keynote	**Chuan-fei Guo** Southern University of Science and Technology	Iontronic skins for accurate measurement of static pressure and high-frequency vibrations
16:00-16:15	57	Invited	**Zhihui Lai** Shenzhen University	Research on a self-powered rolling bearing fault diagnosis method with an energy harvester for self-sensing
16:15-16:30	119	Oral	**Jinhong Dai** The Hong Kong University of Science and Technology (Guangzhou)	A self-powered magnetic energy harvester with high output power on transmission lines
16:30-16:45	104	Oral	**Nan Wu** University of Manitoba	Hybrid Energy generator with multiple outputs
16:45-17:00	142	Oral	**Guoyuan Xia** The Chinese University of Hong Kong	Comprehensive Investigation of a Broadband Wearable Energy Harvester Using Adaptive Kinetic Energy Reallocation Mechanism
17:00-17:15	149	Oral	**Ruisi Zong** Guizhou University	An intelligent headphones system integrating multimodal signal sensing and remote interactive control based on artificial intelligence algorithms
17:15-17:30	245	Oral	**Xiya Yang** Jinan University	Self-Powered Triboelectric Buoys and Applications in Marine IoT

Date: Jul 12 (Saturday) Afternoon

Session 5-2: Flow-induced vibration energy harvesting
Venue: Room 1527
Chairs: Prof. Lin Ding, Chongqing University
Prof. Haitao Li, North University of China

Time	No.	Activity	Speaker	Title
15:30-15:45		**Invited**	**Haitao Li** North university of China	On the use of fractal geometry to boost galloping-based wind energy harvesting
15:45-16:00	**54**	**Oral**	**Ahmed Yassen** University of Warwick	Experimental analysis of a piezoelectric wind energy harvester: frequency response and power optimization
16:00-16:15	**80**	**Oral**	**Shen Li** Chongqing University	Triboelectric–electromagnetic–piezoelectric hybrid omnidirectional wind energy harvester based on flutter with high output power and wide speed range
16:15-16:30	**117**	**Oral**	**Maojin Gong** King Abdullah University of Science & Technology	Flow-induced vibration energy harvester based on wake interference and wake-induced effects
16:30-16:45	**167**	**Oral**	**Guannan Hao** Qingdao University	A dual- buckling piezoelectric energy harvester under water droplet impact
16:45-17:00	**30**	**Oral**	**Xi Chen** Nanjing University of Aeronautics and Astronautics,	Deep-learning enabled inverse design of piezoelectric energy harvester

Date: Jul 13 (Sunday) Morning

Session 15-1: Nonlinear Dynamics in Energy Harvesting
Venue: LTA
Chairs: Prof. Junrui Liang, ShanghaiTech University
Prof. Zhaoye Qin, Tsinghua University
Prof. Zhengbao Yang, The Hong Kong University of Science and Technology

Time	No.	Activity	Speaker	Title
10:40-11:10		Virtual Keynote	Alper Erturk Georgia Institute of Technology	Phononic and metamaterial concepts for enhanced energy harvesting from elastic and acoustic waves
11:10-11:25	8	Oral	**Xuecheng Shi** Northwestern Polytechnical University	Random response and reliability analysis of a galloping piezoelectric energy harvesting system
11:25-11:40	159	Oral	**Xukun Su** Shenzhen University	Perfromance Enhancement through Optimizing Coupling Coefficient in Rotational Electromagnetic Energy Harvesters
11:40-11:55	189	Oral	**Qinxue Tan** Chang'an University	A bistable plucking-rotation mechanism for ultralow-frequency mechanical energy harvesting
11:55-12:10	140	Oral	**Jianwei Zhang** Zhejiang Normal University	New insights into the dynamic characteristics of dielectric elastomer generators

Session 17: Spacecraft Vibration and Energy Harvesting
Venue: Room 1103
Chairs: Prof. Ti Chen, Nanjing University of Aeronautics and Astronautics
Prof. Jinjun Shan, York University
Prof. Shiyuan Jia, Beijing University

Time	No.	Activity	Speaker	Title
10:40-11:10	200	Oral	**Shuo Chen** Nanjing University of Aeronautics and Astronautics	Hybrid Velocity-Based Control Strategy for Tethered Satellite Deployment
11:10-11:25	197	Oral	**Shouxu Chen** Nanjing University of Aeronautics and Astronautics	Libration Suppression of Tethered Satellite System during Repeatable Deployment and Retrieval
11:25-11:40	11	Oral	**Geng Chen** Southeast University	Development of a Thermoacoustic Amplifier for Enhanced Acoustic Energy Harvesting
11:40-11:55	220	Oral	**Yinhao Gao** Beijing University of Posts and Telecommunications	Coordinated Attitude-Vibration Control for Rigid-Flexible Coupled Spacecraft Using Distributed Parameter Optimization and Dual-Loop Feedback

Date: Jul 13 (Sunday) Morning

Session 3-2: Rotational energy harvesting
Venue: Room 1104
Chairs: Prof. Shengxi Zhou, Northwestern Polytechnical University
Prof. Yang Kuang, Central South University
Prof. Haitao Xu, Changchun University of Science and Technology

Time	No.	Activity	Speaker	Title
10:40-11:10	113	Invited	**Haitao Xu** Changchun University of Science and Technology	Analysis of an Energy Harvester and its Potential Application in Enhancing Weak Signals
11:10-11:25	97	Oral	**Pan Zhang** ChongQing University	An electromagnetic energy harvester based on single pendulum structure inside a bearing hollow roller
11:25-11:40	139	Oral	**Shuzhe Zhou** Northwestern Polytechnical University	Theoretical model and experiments of a mechanical-transmission type energy harvester for floating slab track
11:40-11:55	252	Oral	**Haopeng Xie** Beijing Institute of Technology, Zhuhai	A Spherical Pendulum-Based Multi-directional Energy Harvester for Distirbuted Self-Powered Ocean Monitoring
11:55-12:05	120	Oral	**Luyao Zhao** Shenyang University of Technology	Manufacturing, Characteristic Analysis and Actuation Application of Flexible Magnetostrictive Fiber Ribbon Film

Session 6-2: Energy harvesting and self-powered wearable systems
Venue: Room 1409
Chairs: Prof. Sheng Liu, Hunan Institute of Engineering
Prof. Hongxiang Zou, Hunan Institute of Engineering

Time	No.	Activity	Speaker	Title
10:40-11:10	58	Keynote	**Keon Jae Lee** Korea Advanced Institute of Science & Technology (KAIST)	Self-powered Flexible Piezoelectric sensor Toward Commercialization
11:10-11:25	123	Invited	**Sheng Liu** Hunan Institute of Engineering	Hierarchical rGO-based triboelectric sensors enable motion monitoring and trajectory tracking
11:25-11:40	194	Oral	**Wenbin Kang** City University of Hong Kong	Energy harvesting using ferroelectric switching
11:40-11:55	187	Oral	**Yueyue Zhu** Hunan Institute of Engineering	Bio-Inspired Morphing Mechanisms and Dynamic Characteristics of Self-Powered Marine Detectors
11:55-12:10	133	Oral	**Kai Wang** Nanjing University of Posts and Telecommunications	A self-powered inertial switch with asymmetry double-well potential mechanism

Date: Jul 13 (Sunday) Morning

Session 16-2: Transfer, conversion and storage of thermal energy
Venue: Room 1410
Chairs: Prof. Bingyang Cao, Tsinghua University
Prof. Junyi Cao, Xian Jiao Tong University

Time	No.	Activity	Speaker	Title
10:40-11:10	234	Keynote	**Jie Chen** Tongji University	Phonon Transport and Heat Conduction in Low-Dimensional Systems
11:10-11:25	242	Invited	**Yao Lu** Southern University of Science and Technology	High-performance Chalcogenide-based Flexible Thermoelectric Films and Devices
11:25-11:40	255	Invited	**Guangzhao Qin** Hunan University	Anisotropic heat transfer by atomic-level design
11:40-11:55	258	Invited	**Wei Wu** City University of Hong Kong	Moisture-driven Passive Thermal Management for New Energy and Smart Devices
11:55-12:10	111	Oral	**Ziyan Qian** The Hong Kong University of Science and Technology	Alloying-induced degradation of thermal conductivity in AlN films

Date: Jul 13 (Sunday) Afternoon

Session 15-2: Nonlinear Dynamics in Energy Harvesting
Venue: LTA
Chairs: Prof. Biao Wang, Shanghai University
Prof. Shiyuan Liu, The Hong Kong University of Science and Technology (Guangzhou)
Prof. Zhihe Long, University of Electronic Science and Technology of China

Time	No.	Activity	Speaker	Title
13:00-13:30		Keynote	**Liqun Chen** School of Science, Harbin Institute of Technology	Internal-Resonance-Based Vibration Energy Harvesting via Geometrical Nonlinearities
13:30-13:45		Invited	**Kefu Liu** Lakehead University	Design and Evaluation of Three Variant Nonlinear Energy Sinks
13:45-14:00	151	Invited	**Zhihe Long** University of Electronic Science and Technology of China	Self-powered single-inductor rectifier-less SSHI array interface with the MPPT technique for piezoelectric energy harvesting
14:00-14:15	65	Invited	**Biao Wang** Shanghai University	A fully self-powered digital wearable device for the adjuvant treatment of plantar fasciitis
14:15-14:30	137	Oral	**Dibin Zhu** Shanghai Jiao Tong University	Ultra-Wideband Vibration Energy Harvesting with Hybrid Resonators
14:30-14:45	201	Oral	**Yuhang Huang** Hunan University	Adaptive bistable built-in ocean wave energy harvester for unmanned surface vessels
14:45-15:00	56	Oral	**Weiyang Qin** Northwestern Polytechnical University	Harvesting vibration energy by an inverted fork structure combining electromagnetic and piezoelectric effects

Date: Jul 13 (Sunday) Afternoon

Session 18: Structural Dynamics and Control
Venue: Room 1103
Chairs: Prof. Yanhu Zhang, Jiangsu University
Prof. Bin Yang, Shanghai Jiao Tong University

Time	No.	Activity	Speaker	Title
13:00-13:30	24	Keynote	**Wei-Hsin Liao** The Chinese University of Hong Kong	Energy Harvesting from Vibration and Human Motion: Research and Applications
13:30-13:45	224	Oral	**Guoying Zhao** Sun Yat-sen University	Active vibration isolation system for the ground-simulator of space-borne gravitational wave detector
13:45-14:00	26	Oral	**Yu Pan** Tongji University	Dynamic Influence of an Energy Harvesting Tie/Sleeper to Railway Track
14:00-14:15	147	Oral	**Fangzhi Shi** Hunan University	A self-powered, self-driven sensing, and morphing-integrated AUV
14:15-14:30	6	Oral	**Tao Wang** Zhejiang University	Design, Modeling and Experiments of a Double-Pendulum Vibration Energy Harvester
14:30-14:45	70	Oral	**Yukun Wang** Beijing Institute of Technology	Energy Conversion Method for High-Speed Flyer Driven by Detonation
14:45-15:00		Oral	**Xingyu Bai** Shanghai Jiao Tong University	Multielement Self-focusing Piezoelectric Micro-machined Transducer for Cross-tissue Ultrasonic Stimulation

Date: Jul 13 (Sunday) Afternoon

Session 16-3: Transfer, conversion and storage of thermal energy
Venue: Room 1104
Chairs: Prof. Rujun Ma, Nankai University
Prof. Huicong Liu, Soochow University

Time	No.	Activity	Speaker	Title
13:00-13:15		Invited	**Longquan Chen** University of Electronic Science and Technology of China	Condensate Halos around Freezing Droplets
13:15-13:30	239	Invited	**Meng Lin** Southern University of Science and Technology	Solar Fuel Processing at Elevated Temperatures
13:30-13:45	253	Invited	**Cheng-Te Lin** Ningbo Institute of Materials Technology and Engineering	Advanced Thermal Management Materials for Electronic Packaging
13:45-14:00	227	Invited	**Yan Huang** Harbin Institute of Technology Shenzhen	All-inorganic hydrogel thermoelectrochemical cell
14:00-14:15	229	Invited	**Jing Li** City University of Hong Kong	Multidimensional Materials for Extreme Environment Water and Energy Applications
14:15-14:30	228	Invited	**Shengying Yue** Xi'an Jiaotong University	Theoretical study on flexural heat transfer
14:30-14:45	232	Invited	**Yuqiang Zeng** Southern University of Science and Technology	Thermal Sensing and Regualtion for Fast-Charging Batteries
14:45-15:00	223	Invited	**Kun Zhang** Institute of Metal Research, Chinese Academy of Sciences	Controllable Heat Storage for Efficient Thermal Energy Management
15:00-15:15		Invited	**Zuyuan Wang** University of Electronic Science and Technology of China	Recent advances in thermal energy storage and thermal management by utilizing phase change materials

Date: Jul 13 (Sunday) Afternoon

Session 16-4: Transfer, conversion and storage of thermal energy
Venue: Room 1409
Chairs: Prof. Yanguang Zhou, The Hong Kong University of Science and Technology
Prof. Kangqi Fan, Xidian University

Time	No.	Activity	Speaker	Title
13:00-13:15	246	Invited	**Liang Guo** Southern University of Science and Technology	Acoustic Phonon Dynamics Detection by Time-Resolved Optical Spectroscopy
13:15-13:30	235	Invited	**Puqing Jiang** Huazhong University of Science and Technology	Simultaneous Determination of Thermal Conductivity and Heat Capacity of Molten Salts via the Optical-Based DSPS Method
13:30-13:45	231	Invited	**Jian Zeng** The Hong Kong University of Science and Technology (Guangzhou)	Energetically Autarkic Direct Air Capture of Carbon Dioxide
13:45-14:00	230	Invited	**Xiaoliang Zhang** Dalian University of Technology	Substrate Effects on the Thermal Transport in Two-Dimensional Materials
14:00-14:15	96	Invited	**Qiye Zheng** The Hong Kong University of Science and Technology	Tuning Thermal Conductivity in Perovskite Oxides by Strain Fields
14:15-14:30	241	Invited	**Shiyun Xiong** Guangdong University of Technology	Correcting force error-induced underestimation of lattice thermal conductivity in machine learning molecular dynamics
14:30-14:45	233	Invited	**Xi Shen** The Hong Kong Polytechnic University	Anisotropic polymer nanocomposites for thermal energy regulation
14:45-15:00	107	Oral	**Guangwu Zhang** The Hong Kong University of Science and Technology	Significant suppression in Thermal Transport of β-Ga2O3 Induced by Strain Gradient
15:00-15:15	150	Oral	**Chenbo Zhang** Tongji University	Enhanced Figure-of-Merit and Fatigue Resistance of Strontium Barium Niobate for Pyroelectric Energy Conversion

Date: Jul 13 (Sunday) Afternoon

Session 8-2: Energy Harvesting Applications of Metamaterials and Phononic Crystals
Venue: Room 1410
Chairs: Prof. Yupei Jian, Southwest Jiaotong University
Prof. Yanglong Lu The Hong Kong University of Science and Technology

Time	No.	Activity	Speaker	Title
13:00-13:15	204	Invited	**Yanglong Lu** The Hong Kong University of Science and Technology	Design, optimization, and additive manufacturing of metastructures based on periodic surface lattice structures
13:15-13:30	128	Invited	**Bao Zhao** Hong Kong Polytechnic University	Synchronized Switching Circuits Enabled Electromechanical Metamaterial for Broadband Vibration Attenuation and Self-powered Sensing
13:30-13:45	23	Oral	**Hongyan Wang** Qiqihar University	Parameter Effect Analysis for Piezoelectric Metamaterial Beam with defects
13:45-14:00	115	Oral	**Yunfei Xu** Chongqing university	Metasurface-enabled Lamb Wave Multiple Access Communication

Poster Sessions

Venue: The lobby, out of LTA

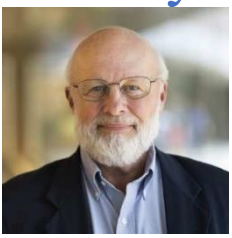
Poster Chair： Prof. Lihua Tang, Auckland University
Prof. Wei-Hsin Liao, The Chinese University of Hong Kong

No.	Title	Author	Institution
P-01	Improving the wind energy harvesting performance with double upstream fractal bluff bodies	Haili Gao	North University of China
P-02	Wall-proximity effects on vortex-induced vibration and energy harvesting of a cylinder	Hao Jing	Beijing Jiaotong University
P-03	Flexible Rotational Energy Harvesting for Condition Monitoring of Rolling Bearings	Hao Wang	Xi'an Jiaotong University
P-04	Wind Energy Harvester with Double-Rotor Counter-Rotating for Ventilation Parameter Monitoring System in Coal Mine	Jialin Zhang	Xi'an University of Science and Technology
P-05	Experimental investigation of flow-induced vibration energy harvesting in wind turbulent flow	Jingyan Wang	Beijing Jiaotong University
P-06	High-temperature Creep Mechanism of Additive Manufactured IN718: Experimental Study and Crystal Plasticity mModeling	Kaiyang Zhu	Northwestern Polytechnical University
P-07	Comparison and Optimization of Magnet Configurations in m-shaped Variable Reluctance Energy Harvester	Mengfei Wu	Mid Sweden University
P-08	Optimization of a comb-like beam piezoelectric energy harvester using the parallel separated multi-input neural network surrogate model	Mengyuan Ren	Huazhong University of Science and Technology
P-09	ViPSN 2.0: A Reconfigurable Battery-free IoT Platform for Vibration Energy Harvesting	Mianxin Xiao	Xidian University
P-10	Vibration Suppression Performance of Parallel Asymmetric Nonlinear Energy Sinks under Impulse Excitation	Muxuan Guo	The University of Auckland
P-11	A graded E-shaped piezoelectric energy harvester for ultra-broadband and high-capability energy harvesting	Pingping Liu	Beijing Jiaotong University
P-12	Multiple Spherical Magnets-Based Annular Electromagnetic Energy Harvester	Quan An	Southern University of Science and Technology
P-13	Vibration and Acoustic Radiation Suppression of Multi-Layer Composite Sandwich Plates with Imperfect Acoustic Black Hole	Sen Zhang	Northwestern Polytechnical University
P-14	A Power Density Enhancing Mechanism Based on A Magnetic Rotor with Built-in Eccentricity for Biomechanical Energy Harvesters	Shuyu Fan	Zhejiang University
P-15	Theoretical model and experiments of a mechanical-transmission type energy harvester for floating slab track	Shuzhe Zhou	Northwestern Polytechnical University

P-16	Hierarchical rGO-Based Triboelectric Sensors Enable Motion Monitoring and Trajectory Tracking	Weiming Qing	Hunan Institute of Engineering
P-17	Electron-phonon coupling in polycrystalline nanostructures	Wenxiang Liu	The Hong Kong University of Science and Technology
P-18	Kirigami-inspired multifunctional re-entrant metamaterials featuring vibration mitigation, energy absorption, and load bearing	Xinwei Wu	Northwestern Polytechnical University
P-19	A Song of Ice and Fire: Ice Pressing for Piezoceramics Leveraging the Mpemba Effect	Xiaodan Yang	Hong Kong University of Science and Technology
P-20	Design of a New Kinetic Energy Harvesting Floor with Displacement Amplification and Mechanical Energy Storage Mechanisms	Yaohua Feng	Shanghai Tech University
P-21	A Battery-Free Wireless Keyboard	Yaoyi Li	Xidian University
P-22	Ultrasonic Power Packs: an Acoustical Solution to Energy Supply for Implantable Medical Devices (IMDs)	Yi Zheng	Hong Kong University of Science and Technology
P-23	Paper-Based Electret Sensor/Actuator Array for Tactile Interaction	Yunfei Bai	Tsinghua University
P-24	Vibration Energy Harvester Applied to Self-Energy Intelligent Tire	Yuteng Jing	Southern University of Science and Technology
P-25	Programmable Piezoelectric Films Through Interfacial Engineering	Yuxin Chen	The Hong Kong University of Science and Technology (Guangzhou)
P-26	Transient-motion-powered Fingertip Interaction Game	Yuxing Zhong	Xidian University
P-27	Studies on Air Filtration and Face Masks: Self-charging, Biodegradability, Antibacterial and Mass-manufacturing	Zhenqi Wang	Hong Kong University of Science and Technology
P-28	Kresling-Origami-Inspired Nonlinear Vibration Absorber with Quasi-Zero Stiffness	Yi Wu	The University of Auckland
P-29	A Spherical Pendulum-Based Multi-directional Energy Harvester for Distributed Self-Powered Ocean Monitoring	Haopeng Xie	Beijing Institute of Technology
P-30	Random response and reliability analysis of a galloping piezoelectric energy harvesting system	Ying Zhang	Northwestern Polytechnical University
P-31	A Flexible Piezoelectret Sensor for High-Sensitivity Crack Monitoring	Guocheng Wang	Tsinghua University
P-32	Additive Manufacturing of Charge-Programmed PVDF with Giant Piezoelectric Response	Xiaobing Dong	Hunan University

P-33	Energy harvesting and data-driven identification method for vortex-induced vibration systems	Kang Lu	Northwestern Polytechnical University
P-34	DNA-Helix-Inspired Kirigami Nanogenerator with Dual-Function Energy Absorption and Conversion	Xinhui Mao	Northwestern Polytechnical University
P-35	One-Wire Reconfigurable and Damage-Tolerant Sensor Matrix Inspired by Auditory Tonotopy	Zhihe Long	University of Electronic Science and Technology of China
P-36	Mutualistic Symbiotic Wireless Node for Next-Era Smart Transportation	Yuepeng Feng	Harbin Institute of Technology

Plenary Speakers



Daniel Inman

University of Michigan

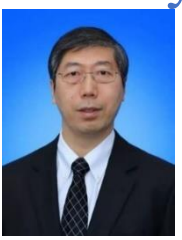
Topic: Vibration and Morphing Aircraft

Morphing aircraft, especially applied to unmanned aircraft, present a rich area of research both from the point of view of general structural dynamics and from the possibility of energy harvesting. Some past results are reviewed, some current results illustrated and new aeras of research are suggested. Coupled with new learning algorithms, methods for designing smart autonomous morphing airfoils for recovering from flow induced vibrations. Concepts of perception of vibration through learning methods are presented. Hardware based reinforcement learning (RL) techniques are used to teach a smart morphing wing to respond to flow induced vibrations (gusts), following the inspiration of gliding gulls who respond immediately and autonomously to unknown changes in flow to maintain stability and control in unpredictable vibration environments. Thoughts on future research are also presented.

Biography

Prof. Daniel J. Inman is the Harm Buning Collegiate Professor and former Chair of the Department of Aerospace Engineering at the University of Michigan. Formerly he was the Director of the Center for Intelligent Material Systems and Structures and the G.R. Goodson Professor in the Department of Mechanical Engineering at Virginia Tech. Since 1980, he has published 9 books (on energy harvesting, vibration, control, statics, and dynamics), eight software manuals, 20 book chapters, over 422 journal papers and 687 proceedings papers, given 80 keynote or plenary lectures. He is a Fellow of the American Academy of Mechanics (AAM), the American Society of Mechanical Engineers (ASME), the International Institute of Acoustics and Vibration (IIAV), and the American Institute of Aeronautics and Astronautics (AIAA). He was the Editor-in-Chief of the Journal of Intelligent Material Systems and Structures (1999- 2025), served as Editor-in-Chief of the ASME Journal of Vibration and Acoustics (1989- 1999), the Shock and Vibration Digest (1998-2001), and the journal Shock and Vibration (1999-2010).

Plenary Speakers



Jinsong Leng

Harbin Institute of Technology

Topic: Smart structures and 4D printing: from aerospace to biomedical applications

Smart materials and structures that can respond actively to external stimuli. They feature active large deformation, variable stiffness, diverse control methods, reusability, and the ability to be formed in large sizes. They have demonstrated significant application potential and practical value in fields such as aerospace, biomedicine, the textile industry, and electronic devices. This work covers the fabrication of shape memory polymers and their composites, the design of smart structures, 4D printing technology and applications. We have designed a series of space-deployable structures based on shape memory polymer composite, which was successfully applied in the Tianwen-1 Mars probe; Smart structures such as cardiac occlusion and bone tissue structures were fabricated through 4D printing technology; Combining energy harvesting technology, a variety of health monitoring devices with integrated sensing functions have been developed, achieving the monitoring of motion states, etc. It has great application prospects in fields such as aerospace structural technology and biomedicine in the future.

Biography

Prof. Jinsong Leng is a Professor at Harbin Institute of Technology, China. He is a Member of Chinese Academy of Sciences, the Foreign Member of Academia Europaea, Member of the European Academy of Sciences and Arts. He is the Dean of School of Future Technology, Director of the Center for Smart Materials and Structures (CSMS), Director of International Center for Applied Mechanics at Harbin Institute of Technology, and Deputy Director of the Academic Committee of Harbin Institute of Technology. He currently serves as Vice President of the International Committee on Composite Materials (ICCM), Vice President of Chinese Society of Theoretical and Applied Mechanics (CSTAM), Vice President of Chinese Society of Aeronautics and Astronautics (CSAA), and Editor-in-Chief of the International Journal of Smart and Nano Materials (IJSNM). He was elected as Fellow of American Association for the Advancement of Science (AAAS), Fellow of the Society of Photo-Optical Instrumentation Engineers (SPIE), Fellow of American Society of Mechanical Engineers (ASME).

Plenary Speakers

Zhong Lin Wang

Beijing Institute of Nanoenergy and Nanosystems

Topic：Triboelectric nanogenerators (TENG) for sustainable energy and systems

Triboelectric nanogenerator (TENG) was invented by Wang's group in 2012, which is based on the coupling of triboelectrification and electrostatic induction effects for converting mechanical energy into electric power. TENG is playing a vitally important role in the distributed energy and self-powered systems, with applications in internet of things, AL, environmental/infrastructural monitoring, medical science, environmental science, and security. TENG is most effective for utilization of high-entropy energy, which is the random, low-density, low-grade mechanical energy widely-distributed in our living environment and in nature. There are now over 16,000 scientists distributed in 90 countries and regions around the globe who have published papers on TENG. This presentation will first focus on the advances in fundamental science made due to the discovery of TENG. Then we will focus on the potential industrial impacts that have been made by TENG. We will show how this new field will benefit to the sustainable development of humankinds.

Biography

Prof. Zhong Lin Wang is a preeminent physicist and materials scientist. He currently serves as the Director of the Beijing Institute of Nanoenergy and Nanosystems and holds the distinguished titles of Regents' Professor and Hightower Chair (Emeritus) at the Georgia Institute of Technology. Dr. Wang is widely recognized as the pioneer of the nanogenerators field, which has enabled advancements in distributed energy, self-powered sensors, and large-scale blue energy. His scientific impact is unparalleled. Among 100,000 scientists across all fields worldwide, he has been ranked #1 for single-year scientific impact continuously from 2019 to 2024, #2 in career scientific impact, and #1 in Materials Science. His research has garnered over 480,000 citations on Google Scholar, with an extraordinary h-index of 330, underscoring his immense influence and contributions to science.

Plenary Speakers

Jean Zu

Stevens Institute of Technology

Topic：Design and development of nonlinear Piezoelectric energy harvesters

Vibration-based piezoelectric energy harvesting opens up a promising avenue for power generation from ambient vibrations. The goal of piezoelectric energy harvesters is to replace batteries to supply power to small electronic devices. A conventional piezoelectric energy harvester uses a cantilever beam with piezoelectric layers attached. While simple and compact, conventional piezoelectric energy harvester can only scavenge vibrations effectively in a small range of frequency and in a single direction. Since ambient vibration sources vary in frequencies and directions, it is important to expand working bandwidth and multi-directionality of piezoelectric energy harvesters. This talk focuses on design and development of different nonlinear vibration-based piezoelectric energy harvesters. Geometric nonlinear configurations and magnet-induced structures are presented to improve functionality of piezoelectric energy harvesters. Theoretical and experimental results demonstrate that both geometric nonlinearities and magnetic force can effectively expand the bandwidth and harvest vibration energy multi-directionally.

Biography

Prof. Jean Zu is the dean of the Charles V. Schaefer, Jr. School of Engineering & Science at Stevens Institute of Technology in Hoboken, New Jersey She is the first Chinese Canadian Chair of the Department of University of Toronto since its establishment two hundred years ago, and the first Chinese Canadian President of CSME and EIC. Jean Zu's research has been focused on mechanical vibrations and dynamics. She has successfully collaborated with many different companies on research projects with focus on automotive applications. In recent years, Jean Zu has extended her research to mechatronics in biomedical applications and has gained much experience in development of bio-instruments. She has published over 200 papers including over 100 journal papers and has supervised 22 Ph.D. students and 22 M.A.Sc. students. She is Fellow of Canadian Academy of Engineering, American Society of Mechanical Engineers (ASME), Engineering Institute of Canada (EIC), Canadian Society for Mechanical Engineering (CSME), American Association for the Advancement of Science (AAAS). She served as President of Canadian Society for Mechanical Engineering in 2006-2008.

Keynote Speakers

Chris R Bowen
University of Bath

Topic: *Processing of Smart Porous Electro-ceramic Transducers (ProSPECT)*

Abstract: The continuing need for improved performance and reduced power requirements of electronic components, for example for wireless sensor networks, has prompted renewed interest in the development of advanced piezoelectric and pyroelectric sensors which can also be coupled with harvesting technologies capable of capturing energy from ambient vibrations and heat. This presentation provides an overview of piezoelectric materials for sensing, with the closely related sub-classes of pyroelectrics and ferroelectrics. The particular advantages of exploiting porosity in these fascinating materials are emphasised, including how the pore structure and volume fraction can be tailored to optimise the dielectric and ferroelectric properties of these materials; these include aligned pores formed by freeze casting, see Fig. 1. Examples of modeling and manufacture of porous materials sensors and energy harvesters are discussed, including SONAR applications and hydrostatic behaviour. The potential of novel porous, composites, and sandwich structures are briefly described, and the range of potential benefits of using porosity in ferroelectrics and finally overviewed. This work is supported by UKRI Frontier Research Guarantee on "Processing of Smart Porous Electro-Ceramic Transducers - ProSPECT", project No. EP/X023265/1.

Chengkuo Lee
National University of Singapore

Topic: *Progress in Self-Powered Sensors – From Wearables to Agriculture*

Abstract: Self-powered wearable sensors have promoted low-power or battery-free sensing platforms for applications including human-machine interaction, soft robotics, and electronic skin (e-Skin). Tactile sensors featuring artificial neuron like self-generated zero-biased signals are developed to realize synergistic sensing of multimodal information (vibration, material, texture, pressure, and temperature) in a single device will be discussed. Secondly, tactile sensors attached on robotic fingertips using multilayered structural design are investigated to recognize distinct materials, curvatures, and pressure simultaneously, thus decoupling different modalities to enable more accurate detection. Combined with machine learning analytics, these sensors enable high-precision recognition of multimodal sensory information. Aiming at outdoor smart farming IoT sensing system, a multifunctional hydrogel is developed as a stable energy harvester that continuously generates direct current (DC) output with an average power density of 1.9 W m-3 for nearly 60 days of operation in normal environments (24℃, 60% RH). Moreover, this hydrogel enables noninvasive and self-powered monitoring of leaf relative water content (RWC), providing critical data on evaluating plant health, previously obtainable only through invasive or high-power consumption methods. This multifunctional hydrogel enables self-sustainable outdoor systems with scalable and low-cost production, paving the way for future agriculture.

Jae Y. Park
Kwangwoon University

Topic: *Vibration-Driven Hybrid Energy Harvesting Technologies for Self-Sustainable Smart IoT Systems*

Abstract: In this talk, I introduce recent advancements in hybrid triboelectric-electromagnetic energy harvesting technologies designed to generate high-output electricity from low-frequency, non-periodic vibrations, such as human body movements, wind, water waves, and machinery vibrations. These technologies are particularly promising for developing self-sustaining Internet of Things (IoT) systems and wearable electronics. Hybrid mechanical energy harvesting offers an eco-friendly and long-lasting power source, making it a strong candidate for enabling battery-free IoT systems in applications such as real-time wearable healthcare and indoor/outdoor environmental monitoring. Additionally, I discuss triboelectric-based self-powered sensors and their applications, which enable real-time
monitoring of human respiration, posture, and activity, as well as object movement and machinery vibrations, without the need for an external power source. I also present triboelectric nanogenerators enhanced through various nanomaterials, fabrication processes, and structural designs to improve their performance. Furthermore, I introduce a battery-free marine environmental monitoring platform that integrates four electrochemical sensors with a water wave-driven hybrid energy harvesting device, enabling real-time water quality and marine environment monitoring.

Grzegorz Litak
Lublin University of Technology

Topic: *Nonlinear Effects in Energy Vibration Harvesting*

Abstract: Kinetic energy harvesting systems are considered as the candidates to supplement electrical power sources for self-powered sensors and other small portable devices. For the relatively small size of an electro-mechanical transducer piezoelectric elements were proposed. The most effective structure of the kinetic energy harvester consists of the composite cantilever beam as a mechanical resonator covered by a piezoelectric layer with corresponding electrodes coupled to electrical circuit. During the deformation of the beam resonator, the piezoelectric transducer provides the electromotive force into the electrical circuit. Such a structure was working well in the region of resonance which is narrow band around the natural frequency of the linear system. Therefore, to adjust this structure to a wider frequency band induced by variable excitation conditions (in terms of source frequencies and amplitudes), the resonator had to be nonlinear. Our studies were performed for the double and triple well polynomial potential and similar shapes. Results obtained for harmonic excitation clearly indicate the existence of multiple solutions and bifurcations. The statistics based on initial conditions indicate the probability of distribution for selected solutions with a fairly large power output. The appearance chaotic solution for the deterministic system was confirmed by the selected nonlinear methods. In case of the mechanical with more degrees of freedom the amplitude amplification mechanism was considered.

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Sang-Woo Kim
Yonsei University

Topic: *Triboelectric Energy Harvesting for Self-Sustained Therapeutic Systems*

Abstract: This presenter will report transcutaneous ultrasound energy harvesting using triboelectric technology. Implantable medical devices (IMDs) are designed to perform or augment the functions of existing organs by using monitoring, measuring, processing units, and the actuation control. Conventional IMDs are powered with primary batteries that require frequent surgeries for maintenance and replacement. Therefore, IMDs require a new reliable and safe powering system to avoid the need for frequent surgeries. Recently my group demonstrated that ultrasound was used to deliver mechanical energy through skin and liquids and demonstrated that a thin implantable vibrating triboelectric nanogenerator (TENG) is able to effectively harvest it. Ultrasound TENG (US-TENG) was triggered with an applied 20-kHz ultrasound. As the second topic, the presenter will deal with our very recent demonstration of a commercial coin battery-sized high-performance inertia-driven TENG (I-TENG) based on body motion and gravity. In a preclinical test, we demonstrate that the encapsulated device successfully harvested energy using real-time output voltage data monitored via a Bluetooth low-energy information-transmitting system. Finally the presenter will report a self-powered disinfection system for the rapid disinfection of air-transmitted bacteria and viruses based on a highly efficient nanowire-assisted electroporation mechanism powered by vibration-driven TENGs that harvest mechanical vibration energy.

Shujun Zhang
University of Wollongong

Topic: *Dielectric energy storage MLCC*

Abstract: Energy storage technique has been extensively studied for numerous applications, in which the dielectric capacitors belong to the category of passive components, which are ubiquitous in electronics. Every year more than 3 trillion multilayer ceramic capacitors (MLCCs) are manufactured from BaTiO3 (BT), the prototypical ferroelectric (FE) ceramic. In comparison with Li-ion batteries or fuel cells, the dielectric capacitors possess high power density (∼104−105 W/kg) resulting from their faster charging/discharging characteristics, which are advantageous for power electronics in electrical vehicles (EVs) and pulse power applications. Based on relaxor FE or Antiferroelectric materials, we fabricated MLCCs using tape-casting approach. For the same capacitor volume, a higher breakdown electric field is expected in the MLCC compared to the monolithic ceramic capacitor, as the breakdown strength exponentially increases as the thickness of the single ceramic layer decreases. However, MLCCs encounter significant challenges due to the heightened loading electric field (E), which can lead to fatigue damage and ultrasonic concussion caused by the electrostrictive strain. To address these issues, we propose an innovative strategy focusing on achieving textured ceramics with reduced electrostrictive coefficient or dielectrics with ultra-weak polarization-strain coupling effect, which effectively reduces strain in MLCCs and greatly improve their stability and reliability.

Keon Jae Lee
Korea Advanced Institute of Science and Technology

Topic: *Self-powered Flexible Piezoelectric Toward Commercialization*

Abstract: This seminar will introduce flexible inorganic piezoelectric membrane that can detect the minute vibration of membrane for self-powered acoustic sensor and blood pressure monitor. Speaker recognition has received spotlight as personalized voice-controlled interface, smart home, biometric authentication. The conventional speaker recognition was realized by a condenser type microphone, which detects sound by measuring the capacitance value between two conducting layers. The condenser type microphone, however, has critical demerits such as low sensitivity, high power consumption, low recognition rate and an unstable circuit due to the large gain amplification. Herein, we reported a machine learning-based acoustic sensor by mimicking the basilar membrane of human cochlear. Highly sensitive self-powered flexible piezoelectric acoustic sensor with a multi-resonant frequency band was employed for voice recognition. Convolutional Neural Network (CNN) were utilized for speaker recognition, resulted in a 97.5% speaker recognition rate with the 75% reduction of error rate compared to that of the reference MEMS microphone. In addition, wearable piezoelectric blood-pressure sensors (WPBPS) were developed for continuous non-invasive arterial pressure monitoring. WPBPS achieves a high normalized sensitivity (0.062 kPa−1), and fast response time (23 ms). The transfer function of a linear regression model converts flexible piezoelectric sensor signals into blood pressure values. Clinical validation of WPBPS was performed on 35 subjects/175 measurements, that satisfies international standard of blood pressure measuring devices.

Renyun Zhang
Mid Sweden University

Topic: *Cellulose materials for triboelectric energy harvesting: from fundamental to engineering*

Abstract: Cellulose-based triboelectric nanogenerators (TENGs) have garnered significant attention for their eco-friendly, flexible, and cost-effective potential in energy harvesting. Among the latest developments, the engineering of triboelectric paper stands out as a groundbreaking strategy to bridge sustainable materials with advanced functionality. In particular, our recent study has demonstrated a scalable fabrication method where common paper is chemically and physically modified to significantly enhance surface charge density, durability, and responsiveness. This engineered paper achieves robust power output while maintaining mechanical flexibility, making it ideal for wearable electronics and smart environmental sensing.
Complementary studies have further elevated cellulose's role in TENGs. Fully green systems exhibit power densities exceeding 300 W m^{-2}, while regenerated cellulose films, tailored via solvent treatments, display optimized charge characteristics and adaptability to different counter-tribolayers. Additionally, upcycled wastepaper and hetero-triboelectric structures based on plant skins offer sustainable routes to high-performance nanogenerators. Collectively, these innovations showcase the transition from fundamental material science to applied

engineering, where cellulose not only supports the green energy agenda but also paves the way for multifunctional, integrated energy-sensing platforms. This presentation highlights the synergy of material tailoring and structural engineering in shaping the future of triboelectric energy systems.

Li-Qun Chen
Harbin Institute of Technology

Topic: *Internal-Resonance-Based Vibration Energy Harvesting via Geometrical Nonlinearities*

Abstract: Advancements in internal-resonance-based vibration energy harvesters are focused on optimizing efficiency via nonlinear modal interactions. A cantilever harvester is designed to utilize geometric nonlinearities and its fabrication is simple as no magnets needed. The significance of internal resonance in multi-degree-of-freedom systems is highlighted to broaden the operational bandwidth and enhancing energy capture where specific frequency ratios facilitate energy exchange between coupled modes. Key findings include the analysis of a U-shaped energy harvester and a cantilever-based harvester with cut-out sections, demonstrating modal coupling effects and dynamic behaviors. Experimental results indicate that internal resonance can be achieved by adjusting the side beam length, with a high degree of commensurability enabling efficient energy transfer. The investigation examines the tolerance of internal resonance to parametric variations, particularly in bending modes, and compares analytical and numerical predictions of system performance. Further analysis explores the integration of in-plane and out-of-plane motions via piezoelectric shear coefficients, enhancing power output. The dynamic response and harmonic interactions between bending and torsion modes are investigated to reveal notable improvements in power density. Parametric studies on excitation amplitude demonstrate that the bending-torsion internal resonance remains effective even at low excitation levels, expanding the device's applicability. In summary, the investigation demonstrates that leveraging internal resonance between bending-bending and bending-torsion modes enhances the power output and bandwidth of vibration-based energy harvesters. The findings highlight the robustness of internal resonance in energy harvesting, offering adaptability to parametric variations and low excitation conditions.

Yuji Suzuki
The University of Tokyo

Topic: *Stretchable Fluorinated Elastomer Electret for Powering Skin Electronics*

Abstract: In this talk, intrinsically stretchable fluorinated elastomer electrets for energy autonomy of skin electronics will be presented. Perfluoroelastomer FFKM has been chosen as a new polymer electret, which is compatible with the MEMS process and has a high surface charge density as a stretchable electret. With the aid of the cross-linking reaction with triallyl isocyanurate for integration of the charge traps, a surface charge density up to 0.6 mC/m2 as well as the linear elastic region up to 180 % has been obtained. TSD measurements reveal that the cross-linking process also improves thermal stability of charges. Based on quantum chemical analysis, the ionization potential, which is found to be a good index of charging

performance, changes with the choice of the cross-linking agent. Further improvement of FFKM-based stretchable electret will be discussed in the presentation.

C.W. Lim
City University of Hong Kong
Topic: *Voltage Controlled Topologically Protected Wave Propagation in Dielectric Membrane-type Acoustic Metamaterials*

Abstract: Topological acoustic metamaterials have attracted enormous research attention in recent years. A significant hallmark of these structures is that they can support interface modes that are robust to structural disturbance and protected by topology. However, most of the studies are often limited to the passive structures that manifest wave propagation at fixed frequency ranges. In view of the shortage of non-passive topological acoustic metamaterials, this work has a primary motive to study the active control of topologically protected wave propagation in soft dielectric membrane-type metamaterials (MAM) based on quantum spin Hall effect (QSHE). The unit cell of the periodic structure is designed with symmetry. Then, the plane wave expansion method is adopted to analytically capture the system dispersion properties. A finite element model is further developed and excellent convergence with the analytical result is presented. By adjusting locations of spraying discs in the honeycomb unit cell, mode shape inversion is observed, separating the topologically trivial state from the nontrivial counterpart. Consequently, the topologically protected interface modes (TPIMs) are observed. Additionally, an electrical voltage that lies within the locking-up limit is applied to MAM to actively control the working frequency of the TPIM. Further, several waveguide paths are designed to control the robust wave propagation in the structure. Conclusively, a voltage-controlled topological metamaterial is designed to actively tune the working frequency range of the device.

Wen-Ming Zhang
Shanghai Jiao Tong University

Topic: *Mechanical intelligence for biomechanical energy harvesting systems: Design methodology and applications*

Abstract: Although significant advances have been witnessed in biomechanical energy harvesting, some issues such as poor electrical output, weak environmental adaptability, and low reliability are difficult to satisfactorily resolve. Herein, we propose a novel concept of mechanical intelligent energy harvesting, i.e., adaptive external excitation and regulation of energy harvesting systems by mechanical structure or mechanism rather than electronic components. The mechanical intelligence design methodology is applied to biomechanical energy harvesting. A series of prototypes such as a cooperative compliant biomechanical energy harvesting vest, a hybrid synergistic drive energy harvesting backpack, an underwater human motion energy harvesting belt, a dual adaptive human motion energy harvesting and posture sensing system are developed. The work of the cooperative compliant biomechanical energy harvesting vest can naturally collaborate with the walking/running of the user due to the mechanical adaptability of the compliant medium and reasonable settings, that is, the harvester collects energy when the user does negative work. The hybrid synergistic drive energy harvesting backpack is connected to human limbs by flexible traction ropes that can achieve hybrid driving by means of inter-limb coordination. It can harvest human motion

energy from a variety of motion types, such as walking, crawling, jumping, and tumbling. These works indicate that the mechanical intelligence design methodology can significantly improve the performance of biomechanical energy harvesting systems and pave the way for their application.

Chuan-Fei Guo
Southern University of Science and Technology

Topic: *Iontronic skins for accurate measurement of static pressure and high-frequency vibrations*

Abstract: Soft artificial skins with sensing functions can convert stimuli, including vibrations and static pressure, to electrical signals. This technology has attracted significant attentions in the field of robots, healthcare, and many others. A key challenge in this field lies in that, the flexible sensors, which consist of viscoelastic materials, can often not accurately measure either high-frequency vibrations or steady pressure because of the creep and hysteresis of soft materials. Other factors, such as the sensing interface, which undergoes contact and detachment, may also dissipate energy to slow down the response of the sensors. Here, we focus on the material-structure-interface-property correlation of soft ionic materials, and show that iontronic skins using low-creep and low-hysteresis poly ionic liquids, can accurately measure pressure and vibrations with low signal drift or hysteresis. We also show that microstructured and bonded interfaces, can effectively speed up since the microstructures can restore and release strain energy, while the bonded interfaces dissipate little energy. As a result, out sensors show negligible signal drift under high steady loads of hundreds of kilopascals, or respond to high-frequency vibrations up to 10k Hz. Such iontronic skins may provide high-fidelity data for applications in haptics of humanoid robots and physiological signal collection of humans.

Meiling Zhu
University of Exeter& Encortec Limited

Topic: *Smart Rail Track Monitoring Enabled by Energy Harvesting*

Abstract: Rail infrastructure operators globally have begun moving towards smart intelligent network infrastructure built upon placing hundreds of thousands of sensors and device types on and along tracks as required for predictive and preventative maintenance. Deployment is currently significantly hampered by the affordability and maintenance liability of suitable trackside power options. Remote cable-delivered power is too expensive and impractical, and battery-powered devices are limited by battery lifetimes, which means disruptive access, cost and safety challenges of regular changes and the sustainability challenge of extensive battery waste. Energy harvesting-based power has been previously considered but has been found to produce too little power using approaches that could be practically implemented. Energy Harvesting Research Group at the University of Exeter and Encortec Ltd spin-out company from the University of Exeter have developed a gamechanger energy harvesting-based power solution which solves this problem, providing an order of magnitude greater autonomous power supply than other energy harvesting approaches through a novel patented approach. This keynote talk will present their key research outcomes in smart rail track monitoring enabled by energy harvesting for rail track monitoring.

Jinhao Qiu
Nanjing University of Aeronautics and Astronautics

Topic: *Application of Acoustic Black Holes in Vibration and Noise Reduction*

Abstract: Acoustic black hole (ABH) effect utilizes the gradient variance of the structural parameters or material properties to realize the diminishing wave velocity in the structure. The main method to realize the ABH structure is to adjust the structure through proper thickness tailoring in order to achieve energy capture in a certain area. ABH structures show great advantages and potential application for vibration and noise reduction in thin-walled structure because of its high efficiency, broadband characteristics and flexible implementation. In this talk, the recent progress in modeling, analysis, implementation and measurement of ABH structures and their applications in vibration damping, noise reduction and energy harvesting are introduced. Methods of modeling and analysis include semi-analytical wavelet method for one-dimensional ABHs, FEM methods for two-dimensional ABHs and wave field visualization based on laser ultrasonic method. Implementation of both embedded ABHs and add-on ABH-based dynamic vibration absorber (ABH-DVA) is introduced. Applications of ABH structures include vibration damping based on embedded ABHs and ABH-DVA, cavity noise reduction based on ABH panels and enhancement of energy harvesting. The mechanism of cavity noise reduction based on ABH panels is also clarified. Finally, the implementation of a one-dimensional ABH based on material stiffness gradation is introduced.

Yunlong Zi
Hong Kong University of Science and Technology – Guangzhou
Topic: *Tribo-induced Wireless Sensing, Visualized Sensing, and Tactile Sensing toward Embodied Intelligence*

Abstract: Embodied intelligence involves AI systems that have a physical presence, such as robots, which must perceive their surroundings to make decisions and take actions. Sensors serve as the "eyes," "ears," and "skin" of these systems, allowing them to capture diverse sensory data from the environment. Tribo-induced sensing solution provides novel methods to convert the high-voltage electric signals to be wireless or optical signals, delivering the new method of wireless sensing through the optical way. As triggered by triboelectricity, such wireless sensing can be conducted in fully-self-powered manner through triboelectric discharge, and optical sensing can be done through triboelectrification-induced electroluminescence. In the meanwhile, triboelectricity can play as a new method in tactile sensing and tactile feedback as a fundamental phenomenon during touching. These studies will pave the road for tribo-induced sensing toward embodied intelligence.

Shengxi Zhou
Northwestern Polytechnical University

Topic: *Mechanical energy harvesters for rail transit infrastructure: Design, modeling and experiments*

Abstract: In rail transit infrastructure, there is a large amount of mechanical energy induced by running trains and surrounding natural wind. How to harvest and utilize such mechanical energy to continuously power wireless sensors and structural health monitoring equipment is a challenging issue. Small-scall mechanical energy harvesting which can be considered as new green energy may solve above challenging issue. Based on recent research progress of his group, this presentation will design, modeling, and experiments of high-performance mechanical energy harvesters, which may promote the development of self-powered wireless sensors in rail transit infrastructure.

Wei-Hsin Liao
The Chinese University of Hong Kong

Topic: *Energy Harvesting from Vibration and Human Motion: Research and Applications*

Abstract: Energy can be harvested from vibration and human motion. Piezoelectric and electromagnetic power generators were used to transform the mechanical energy from vibration and human motion into electrical energy. Since there is a large amount of kinetic energy in the human body during activities, capturing human motion and converting it into electricity is envisaged to render promising prospects for sustainably powering wearables and fulfilling the continuous working requirement of IoT applications. Aimed at scavenging the kinetic energy of the human joints, various energy harvesters have been designed and investigated. In particular, we proposed a hybrid approach to enhance the power generation performance of wrist-worn energy harvester. Based on a highly compact framework, the energy harvester integrated a planetary gear system to increase energy conversion capacity, an asymmetric carrier to improve motion capacity, and a magnetic spring to enhance displacement and velocity responses. These power enhancement mechanisms work together to boost the output power of the energy harvester. We developed an analytical model to theoretically investigate the effects of different power enhancement mechanisms. Prototype were fabricated and tested. Our related work in energy harvesting from vibration and human motion will be presented. Other applications including battey-free wireless keyboard have also been explored.

Qingping Sun
Hong Kong University of Science and Technology

Topic: *Energy Harvesting and Heat Transfer Process in Green Refrigeration using Latent Heat of Shape Memory Alloys*

Abstract: Elastocaloric cooling/heating by harvesting latent heat from phase transition of shape memory alloys (SMAs) attracts considerable interest as a greenhouse-gas-free alternative to

conventional vapor-compression refrigeration. So far, kilowatt-scale elastocaloric cooling prototype has been built based on cyclic compressive phase transition of NiTi shape memory alloy refrigerant. Large specific heat transfer area of NiTi tubular structure and heat transfer nano-fluid enables a giant cooling density of 12.3 W g^{-1}, a cooling power of 1284 Watt, and a temperature lift of 31.6 K. The work has demonstrated great potential of this decarbonization technology for space cooling and heating in the future. This talk, from an experimental point of view, presents recent progress and challenging issues in the energy harvesting process in elastocaloric refrigeration technology. Multidisciplinary interaction and collaborations among material science, heat transfer, manufacturing and solid/fluid mechanics in both theory, experiment and computation will be demonstrated. Some important aspects in design, manufacturing, characterization and scientific understanding in developing this disruptive technology will also be discussed.

Notes: