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浙江科技大学
ZHEJIANG UNIVERSITY OF SCIENCE & TECHNOLOGY

ICAVP2025

Fifth International Conference on Advanced Vehicle Powertrains

Date: 21-23 November 2025

Venue: The Lord Dearing Building, University of Nottingham Ningbo China

CONTENTS

We are pleased to invite industry and academic experts to attend the 2025 International Conference on Advanced Vehicle Powertrains (ICAVP2025), to be held at the University of Nottingham Ningbo China, Ningbo, China, November 21–23, 2025.

ICAVP2025 is aiming to bring together industry and academic experts in the fields of vehicle powertrains and automation as well as adjacent subjects. The format will be both in person and virtual (i.e., online). The conference is jointly organized by **the University of Nottingham Ningbo China, Beihang University's Ningbo Institute of Technology, Zhejiang University of Science & Technology, and National Technical University of Athens (International Joint Laboratory on Advanced Vehicles and Powertrains).**

The 2025 International Conference on Advanced Vehicle Powertrains (ICAVP2025) will open up presentations and discussions on the solutions to both latest and future challenges among the development of the following frontiers, but not limited to:

Structure and function of Powertrains

- Advanced engines/transmissions / drivelines
- Key components of the powertrain
- Energy management of multi configuration powertrain
- Engine fuels, combustion, and emissions
- Innovative materials
- Innovative lubrication

Digitalization and Intelligence of Powertrains

- Modeling and simulation for powertrains
- Powertrain integration/ control/ optimization/diagnosis
- Automobile intelligence and automatic driving controls
- Digital twin technology
- Big data applications
- Digital operation and maintenance

Renewable Powertrains

- Lightweight design
- Alternative low carbon fuels
- Solid oxide fuel cell (SOFC)
- Methanol Power
- Ethanol Power
- Ammonia Power

Zero-emission Motive Powers

- Power battery and BMS
- Proton-exchange membrane fuel cell (PEMFC)
- Catalysts for fuel cells
- Membrane Electrode Assembly (MEA)
- BOPs for PEMFC
- Hydrogen safety technology

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University of Nottingham Ningbo China

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Dr. Dunant Halim,
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ICAVP2025
Fifth International Conference on Advanced Vehicle Powertrains

November 21-23, 2025, Ningbo, China
Programme Schedule

Friday, November 21, 2025		
Schedule	Content	Venue
9:00–17:00	Registration (Available throughout the day)	DB Lobby

Venue: The Lord Dearing Building (DB – refer to Campus Map)

Saturday, November 22, 2025		
Schedule	Content	Venue
8:30–9:00	Registration	DB Lobby
9:00–9:10	Welcome from the Dean of Faculty of Science and Engineering, **Prof. John Zhou** University of Nottingham Ningbo China	DB A05
9:10–9:20	Welcome from the Conference Chair, **Prof. Christos Spitas** University of Nottingham Ningbo China	DB A05
9:20–9:30	Welcome from **Prof. Xubin Song** Zhejiang University of Science & Technology	DB A05
9:30–9:45	Group Photo	DB A05
9:45–10:20	**Keynote Lecture** **Prof. John Zhou** University of Nottingham Ningbo China *"Green Automotive Mobility: Vehicle Emissions Control in the Age of EV"*	DB A05
10:20–10:40	Tea Break & Networking	DB A04
10:40–11:15	**Keynote Lecture** **Prof. Qingkai Han** Northeastern University *"Intelligent Condition Monitoring and Fault Diagnosis Technology for Micro-turbines with Multi-Physical Field Fusion"*	DB A05
11:15–11:50	**Keynote Lecture** **Prof. Giampaolo Buticchi** University of Nottingham Ningbo China *"Intelligent Electronics for Reliable Green Transportation"*	DB A05
12:10–13:40	Full Buffet Lunch	LA Hotel
Parallel Technical Sessions I		
14:00–15:15	Paper Presentations	DB A05
		DB A06
		DB B05
15:15–15:35	Tea Break & Networking	DB A04
Parallel Technical Sessions II		
15:35–16:50	Paper Presentations	DB A05
		DB A06
		DB B05
17:10–19:00	Welcome Dinner	LA Hotel

Parallel Technical Sessions I (November 22, 14:00-15:15)					
Venue	Time	Speaker	Institute/Company	Speech Titles	Session Chair
DB-A05	14:00 – 14:15	Hanghang Cui	Chongqing University, China	Driving Condition-Aware Multi-Agent Integrated Power and Thermal Management for Hybrid Electric Vehicles	Richard Adjei
	14:15 – 14:30	Dongying Liu	Hefei University of Technology, China	Deep Reinforcement Learning-Based Multi-Objective Energy Management for Fuel Cell Heavy-Duty Trucks	
	14:30 – 14:45	Kun Yao	Beihang University, China	Design and Development of Global Energy Management Strategy and Hardware Platform for Hybrid Electric Vehicles	
	14:45 – 15:00	Miqi Wang	Beijing Institute of Technology, China	Thermal Management Strategy Based on Nonlinear Model Predictive Control	
	15:00 – 15:15	Dahri Intidhar	National Engineering School of Gabes, Tunisia	Modeling and Control of a Hybrid Power Generation System Based on Hydrogen and PV Generators	
DB-A06	14:00 – 14:15	Chengyun Su	Bejing Jiaotong University, China	Dynamic Coupling Mechanism and Multi-Objective Cooperative Optimization of Distributed Electric Drive Systems for Commercial Vehicles	Junbin Lai
	14:15 – 14:30	Longhui Qiu	Beihang University, China	High-Precision Modeling Method for Electromechanical Coupling Dynamics of Electric Vehicle Drive Systems	
	14:30 – 14:45	Zixi Liao	University of Nottingham Ningbo China	Modelling and Simulation of a Duct Fan-Powered eVTOL	
	14:45 – 15:00	Chang Xiong	Beihang University, China	Analysis of Meshing Efficiency of Involute Spur Gears Based on a Elastohydrodynamic Lubrication Model	
	15:00 – 15:15	Hui Chun Cheung	University of Nottingham Ningbo China	Analysis and Modelling of Cogging Torque of a PMSM Drive	
DB-B05	14:00 – 14:15	Christos Kalligeros	National Technical University of Athens, Greece	Implementing Neural Networks to Enhance Gear Optimization	Dunant Halim
	14:15 – 14:30	Yanhong Wu	Zhejiang University of Technology, China	Transferable Model-Based Reinforcement Learning for Vehicular Platoon Control	
	14:30 – 14:45	Pengbo Xiao	Hangzhou Dianzi University, China	Integrated Skyhook-ADRC-FOSMC Control Strategy for Active Suspension System	
	14:45 – 15:00	Zainab Akhtar	University of Engineering and Technology Lahore, Pakistan	A Hybrid CNN-LSTM Architecture for Actuator Fault Detection and Classification in BLDC Motors	
	15:00 – 15:15	Roozbeh Golchian Khabaz	Tsinghua University, China	Reinforcement Learning Based Control of Air Supply System for Proton Exchange Membrane Fuel Cell	

Parallel Technical Sessions II (November 22, 15:35-16:50)					
Venue	Time	Speaker	Institute/Company	Speech Titles	Session Chair
DB-A05	15:35 – 15:50	Zhijie Lin	Zhejiang University of Science and Technology, China	Development of Auto Informatics to Advance Low Carbon Powertrains	Richard Adjei
	15:50 – 16:05	Min Wang	Beijing Huairou Laboratory, China	Laser-Induced Hydrophilic Patterning on Bipolar Plates for Ordered Water Management in Proton Exchange Membrane Fuel Cells	
	16:05 – 16:20	Haiwen Ge	Zhejiang Lab, China	Combustion of Liquid Ammonia with Dissolved Hydrogen: a Novel Concept	
	16:20 – 16:35	Shuo Wang	University of Birmingham, United Kingdom	Bees-inspired evolutionary Parameter Identification of PEM Fuel Cell Cold Start Modeling	
	16:35 – 16:50	Abdellah El Idrissi	Ibn Zohr University, Morocco	Robust Hydrogen Production in Hybrid Renewable PEM Electrolysis via Sliding Mode Control	
DB-A06	15:35 – 15:50	Hailong Wang	Zhejiang University of Science and Technology, China	Latest Research on Hydrogen Leakage Sensing Technologies in the Laboratory	Paulo Debiagi
	15:50 – 16:05	Jinhong Fu	Shanghai Jiao Tong University, China	Combustion and Pollutant Formation Characteristics of Methanol–Gasoline Blends under Flash Boiling Spray Conditions	
	16:05 – 16:20	Haoze Wang	Zhejiang University of Science and Technology, China	Numerical Simulation of Hydrogen Leakage Diffusion From a Fuel Cell Vehicle in a Small Garage	
	16:20 – 16:35	Dichun Li	Beijing Institute of Technology, China	Diesel Engine Misfire Diagnosis Based on Instantaneous Speed Using Machine Learning Methods	
	16:35 – 16:50	Weiwei Zhao	Shaanxi Fast Auto Drive Group Co., Ltd., China	Effect of Stator Blade Chord Length on Hydraulic Torque Converter Performance	
DB-B05	15:35 – 15:50	Christos Kalligeros	National Technical University of Athens, Greece	A Review on the Technological Developments in Gear Test Rigs Investigating Gear Rattle and Noise	ChungKet Thein
	15:50 – 16:05	Tingyu Lin	University of Nottingham Ningbo China	Rotor Vibration Suppression via an Active Piezoelectric Bearing with Parameter-Identified Control	
	16:05 – 16:20	Desheng Zou	Beihang University, China	Dynamic Characteristic Analysis of Needle Roller Bearings in Planetary Gear Sets Considering Inner Bore Spalling Faults of Planet Gears	
	16:20 – 16:35	Richard Adjei	University of Nottingham Ningbo China	Multidisciplinary Optimization of a Transonic Fan Blade for an e-Hybrid Low Bypass Micro-Turbofan Engine	
	16:35 – 16:50	Qiang Sun	Ningbo Shenglong (Group) Co., Ltd., China	Design and Simulation Analysis of Integrated Thermal Management System for Extended Range Electric Vehicles	

Sunday, November 23, 2025

Schedule	Content	Venue
8:30–9:00	Registration	DB Lobby
9:00–9:35	**Keynote Lecture** **Prof. Karsten Stahl** Technical University of Munich *"Multi-Objective Optimization of Electric Drive Units for Electric Vehicles"*	DB A05
9:35–10:10	**Keynote Lecture** **Prof. Xiangyang Xu** Beihang University *"Innovation and Practice of Dedicated Hybrid Transmission Configuration in China"*	DB A05
10:10–10:45	**Keynote Lecture** **Prof. Christos Papadopoulos** National Technical University of Athens *"Marine Shaftline Monitoring and Bearing Condition Prognostics: From Model Development to Laboratory and In-Service Validation"*	DB A05
10:45–11:05	Tea Break & Networking	DB A04
Parallel Technical Sessions III		
11:05–12:20	Paper Presentations	DB A05
		DB A06
		DB B05
Closing		
12:20–12:30	Conference Awards (Best Paper & Best Student Paper)	DB A05
12:30–12:40	Concluding Remarks	DB A05
13:00–14:00	Full Buffet Lunch	LA Hotel
14:00–15:00	Campus Tour (Optional)	UNNC

Parallel Technical Sessions III (November 23, 11:05-12:20)					
Venue	Time	Speaker	Institute/Company	Speech Titles	Session Chair
DB-A05	11:05 – 11:20	Sayed Reza Shoja Razavi	University of Nottingham Ningbo China	Laser Cladding of High-Entropy Alloy Coatings for Durable and Sustainable Vehicle Powertrains	Sayed Reza Shoja Razavi
	11:20 – 11:35	Baole Pan	Zhejiang University of Science and Technology, China	Point Cloud Denoising Algorithm of Brake Disc Based on Improved Minimum Variance	
	11:35 – 11:50	Wei Luo	Technical University of Munich, Germany	Advanced Method for Gear Mesh Analysis	
	11:50 – 12:05	Houda Belouak	National School of Applied Sciences of Khouribga, Morocco	Wind Turbine Power Converter Architectures and Faults: Proposal of a Hardware-Independent Detection Approach	
DB-A06	11:05 – 11:20	Karsten Stahl	Technical University of Munich, Germany	Zero-Emission Braking System for Electric Vehicles	John Xu
	11:20 – 11:35	Chen Liu	Beijing Institute of Technology, China	Sliding Mode Steering Control for Dual-Motor-Driven Tracked Vehicle with Disturbance Observer	
	11:35 – 11:50	Lei Tao	Ningbo University, China	The Research on Safety and Stability Control of Distributed Drive Vehicles under Motor Torque Failure	
	11:50 – 12:05	Mahdi Mohammadpour	Loughborough University, United Kingdom	Investigating Oil Replenishment in Rolling Element Bearings Using Smoothed Particle Hydrodynamic	
DB-B05	11:05 – 11:20	Wantong Zhao	Beihang University, China	A Novel Design of Wheel-propeller Based Aerial-ground Amphibious Transportation Platform	ChungKet Thein
	11:20 – 11:35	Shoufeng Li	Zhejiang University of Science and Technology, China	Research on Thread Parameter Detection Method of Tire Screws based on Machine Vision	
	11:35 – 11:50	Abdelkarim Ballouti	National School of Applied Sciences Tetouan, Morocco	Spider-Tailed Horned Viper Inspired Optimization: A Novel Approach for Enhancing Grid-Connected Photovoltaic Systems	

University of Nottingham Ningbo China (UNNC) was founded in 2004 with the approval of the Ministry of Education. It is the first Sino-foreign cooperative university in China that possesses an independent legal personality and independent campus, providing bachelor's, master's, and doctoral education. The number of enrolled students is nearly 10,000, and teachers and students come from more than 70 countries and regions. UNNC has been recognized as a 5-star institution by QS Stars Rating and is one of the first Chinese-foreign cooperative universities to have a national postdoctoral research station. Seven subjects were listed among the world's top academic subjects by Shanghai Ranking in 2024. Six subjects ranked within the top 1% of global rankings of Essential Science Indicators (ESI), and 54 UNNC scholars were listed in "World's Top 2% Scientists" published by Stanford University and Elsevier.

UNNC has three faculties: Nottingham University Business School China, Faculty of Science and Engineering, and Faculty of Humanities and Social Sciences. Nottingham University Business School China has been awarded the prestigious Triple Crown accreditation by AACSB, EQUIS and AMBA – a distinction held by fewer than 1% of business schools worldwide. Twelve of the undergraduate programmes from the Faculty of Science and Engineering have obtained international authoritative professional certifications. Faculty of Humanities and Social Sciences has always been at the forefront of teaching and research and is committed to cultivating international professionals and leaders.

UNNC has established partnerships with 160 universities across over 40 countries and regions, and it is dedicated to providing expanded study abroad and exchange opportunities for students.

Data from the university's 2023 graduates indicate that nearly 30% of undergraduate graduates who chose to pursue further studies were admitted to the world's top 10 universities, and almost 80% of undergraduate graduates who were directly employed entered the world's top 500 companies or well-known Chinese and foreign companies, governments and public institutions. Approximately 92% of master's graduates were recruited by the world's top 500 companies or well-known Chinese and foreign companies, governments and public institutions. All doctoral graduates were employed with high quality, and all entered well-renowned universities, research institutions and companies.

Faculty of Science and Engineering

Welcome to the Faculty of Science and Engineering, UNNC! Our faculty brings together a team of leading experts and scholars from the UK and around the globe, dedicated to becoming a world leader in engineering education and research through global collaboration and interdisciplinary development.

We emphasise cultivating students' critical thinking, innovation, logical reasoning, teamwork, and communication skills while instilling a strong commitment to sustainability in technology and the environment.

With the robust support of University of Nottingham's global alumni network of over 350,000 members, along with support from society and government, students at UNNC's Faculty of Science and Engineering will continue to benefit from scholarships, high-quality education and research opportunities, and modern facilities.

Professor John Zhou
Chair Professor of Sustainability Engineering and Environmental Engineering
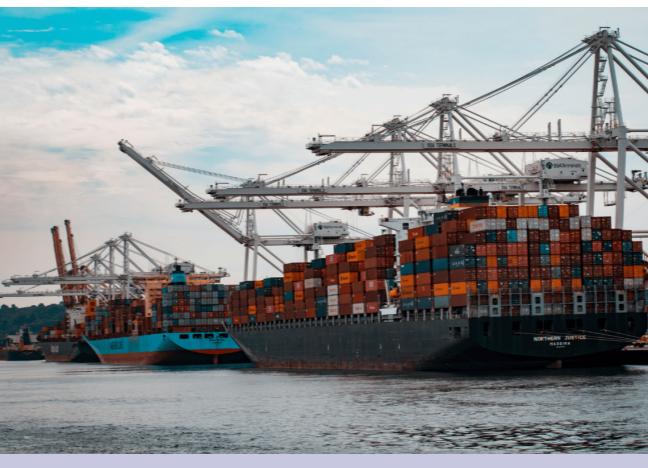Dean of Faculty of Science and Engineering

Research Centre

Advanced Energy and Environmental Materials & Technologies Research Centre

Advanced Mechanical Engineering, Manufacturing and Mobility Research Centre
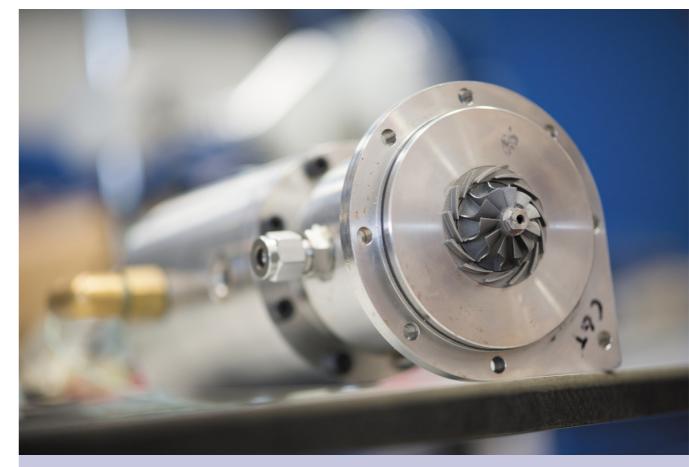

Artificial Intelligence and Optimization Research Centre

Climate and Environmental Solutions Research Centre

Human-centred Sustainable Interaction Research Centre

Power Electronics, Machines and Control Research Centre

Ningbo Institute of Technology, Beihang University

Ningbo Institute of Technology, Beihang University is a high-level research institution jointly established by Ningbo Institute of Technology, Beihang University Ningbo Municipal People's Government It settled in Beilun, Ningbo in June 2018 and is headed by Professor Jiao Zongxia, a member of the Chinese Academy of Engineering.

The Institute covers an area of 220 acres, with 48,000 square meters of scientific research and experimental facilities and more than 22 sets of scientific research equipment. Relying on the strong scientific research and academic accumulation of Beihang University, it aims at high-precision and cutting-edge technology problems in fields of aviation, aerospace, navigation, high-end intelligent manufacturing,

and interdisciplinary medical engineering. The overall goal is to build an innovative research institute that supports the development of aviation and aerospace disciplines, facing frontier basic research, key core technology research, and technology transfer. Under the leadership of 6 academicians, it promotes the construction of innovative research centers. By building platforms for scientific and technological innovation, talent training, and technology transfer, it nurtures high-tech achievements, cultivates high-level innovative talents, the development of advantageous disciplines, promotes high-end science education, and serves the development of Ningbo's high-tech industries and the transformation and upgrading of traditional industries.

Since its establishment, the Institute has been rated as a new type of research institution in Zhejiang Province, an industrial technology research institute in Ningbo, and a graduate Ningbo Institute of Technology, Beihang University.

It has been approved for the establishment of a national postdoctoral workstation, the Zhejiang Provincial Engineering Research Center for Precision Electromagnetic Control Technology and Equipment, the Ningbo City Engineering Research Center for High-Speed and Efficient Maglev Electromechanical, the Ningbo City Key Laboratory of Advanced Intelligent Transportation Equipment, the Ningbo City Small and Medium-sized Enterprises Public Service

Platform, the Ningbo Science Education Base, the Ningbo City Social Science Popularization Base, and the Ningbo Beilun District Patriotic Education Base.

It has successively won honorary titles of Zhejiang Province's leading innovation team, the First Prize of Machinery Industry Science and Technology Award, the Automotive Engineering Science and Technology Progress Award, China Industry-University-Research Cooperation Innovation Award, and the Ningbo City Excellent Joint Industrial Technology Research Institute.

ZHEJIANG UNIVERSITY OF SCIENCE & TECHNOLOGY

The predecessor of the university was founded in 1980 by Zhejiang University and the Hangzhou Municipal Government. In 2022, it became a doctoral degree-granting institution under construction in Zhejiang Province. In 2023, it was renamed Zhejiang University of Science and Technology. After 45 years of development, the university has grown into a first-class applied undergraduate institution with distinctive regional characteristics and internationalization.

The university currently has two campuses in Xiaoheshan, Hangzhou, and Anji, Huzhou, covering an area of more than 2,900 acres. It has 18 colleges and one teaching department; it offers 55 undergraduate programs, six first-level disciplines for academic master's degrees, and 12 master's professional degree programs. There are nearly 20,000 full-time undergraduate and graduate students, and more than 1,500 international students.

The university has a high-quality team of faculty members with an international vision, high academic level, noble professional ethics, and a reasonable structure. It has more than 1,730 employees, including more than 1,370 full-time teachers, nearly 570 of whom hold senior titles, and 62% of the teachers have a doctoral degree. It boasts nearly 30 top and national-level talents, including Zhejiang Province's top experts, national high-level talent special support program, "Changjiang Scholars and Innovative Team Development Program" team leaders, national hundred-million-talent project, and national outstanding middle-aged and young experts. There are also nearly 140 provincial and ministerial-level talents.

The university is committed to serving national strategies and regional economic and social development, and is dedicated to enhancing its ability to solve major problems in economic and social development. It currently has seven provincial first-class disciplines during the 14th Five-Year Plan period, two disciplines in the top 1% of ESI globally, and 19 provincial and ministerial-level scientific research and innovation platforms and think tanks, including provincial key laboratories, provincial international science and technology cooperation carriers, and Ministry of Education country and regional research centers. It has three Zhejiang Province key scientific and technological innovation teams and two provincial university scientific and technological innovation teams. It has also established 22 local research institutes and centers for the transfer and transformation of scientific and technological achievements in cooperation with local governments. In recent years, it has won more than 40 provincial and ministerial-level scientific research awards, including two national science and technology awards and nine first prizes in provincial science and technology awards.

The university has always regarded international exchange and cooperation as an important development strategy, and its overall level of internationalization ranks third among Zhejiang Province's doctoral and master's degree-granting institutions. It is one of the first universities to pass the quality certification for international students by the Ministry of Education, a base construction unit of the "Sino-German Forum," and one of the first "Zhejiang Province Internationalization Characteristic Universities." It is also one of the first universities for the "Silk Road" Chinese Government Scholarship and a university supported by the China Scholarship Council for the Young Backbone Teacher Overseas Research Program. It has signed 237 cooperation and exchange projects with 183 universities (institutions) in Germany, France, the United States, Australia, and other countries and regions. It has two Sino-foreign cooperative education institutions, one Sino-foreign cooperative undergraduate program, and two overseas Confucius Institutes. The university's Sino-German cooperative education has a long history and unique advantages. It has implemented Sino-German provincial and state-level, and government-level cooperative education projects, and is a pilot institution for Sino-German cooperative training of applied talents determined by the Ministry of Education. It has become an important window for Sino-German education, science and technology, cultural exchanges, and cooperation in Zhejiang Province and even the whole country. During the G20 Hangzhou Summit, the then German Chancellor Merkel praised the achievements of the university's Sino-German cooperation. Former German Presidents Herzog and Wulff have visited the university.

NATIONAL TECHNICAL UNIVERSITY OF ATHENS

NATIONAL TECHNICAL UNIVERSITY OF ATHENS

The National Technical University of Athens is structured according to the continental European system for training engineers, with an emphasis on solid background. The duration of courses leading, after the acquisition of 300 credit units to a Diploma, of Master's level, is five years. The valuable work of NTUA and its international reputation are due to its well-organised educational andresearch system, the quality of its staff and students, and the adequacy of its technical infrastructure. NTUA graduates were pivotal to Greece's pre-war development and to post-war reconstruction. The graduate engineers who staffed public and private technical services and companies were and remain by general consent, equal to their European counterparts. Many have been elected to distinguished teaching and research positions in well-known universities all over the world.

Under Article 16 of the Greek Constitution and consequent laws, and in accordance with its tradition and structure, the primary institutional component of the NTUA's mission, effected through the integrated complex of studies and research, is to provide advanced higher education of outstanding quality in science andtechnology.

For this purpose, NTUA operates as a State University with nine Schools, self-administered by the Senate, the Rector, the Vice-Rectors, the School Presidents, representatives of the academic staff and students from every School, as well as representatives from other university bodies.

NTUA in numbers

- 1837, foundation year

- 9 Schools, 512 faculty members, 4.090 external collaborators, 23.914 students, 300,000 sq.m. of installations.

- Over time, the baccalaureate grades required for admission in all of NTUA schools remain constantly the highest between all Greek academic institutions by specialty. For the year 2016, the minimum grade for admission to the School of Electrical and Computer Engineering, 18,628 points, was the highest nationwide among all schools of the 2nd Scientific Field "Science & Technology".

- According to QS World Universities Ranking 2016, NTUA is the leading academic institution in Greece and the only one in the top 400 institutions worldwide. The School of Civil Engineering is in the 33rd position of the world's best schools by specialty. NTUA is in 67th place worldwide among technological universities.

- At NTUA operate 194 laboratories, 140 of which are certified. In 2015, they were ongoing 1423 national and European research projects.

- NTUA Faculty members publish annually more than 3.000 scientific papers (in journals, conference proceedings, chapters in volumes etc.) which earn more than 20.000 citations.

- In the decade 2000-2010, graduated from NTUA 14.617 students. Of the 120.000 qualified engineers active today in Greece, the majority (over 40%) are NTUA graduates.

HC company

HC company is a local innovative enterprise that focuses on metal sealing solutions and micro fluid control.

HC company developed and manufactured variety of expansion sealing plugs and micro-fluid control items in high quality, and these can be widely used in three electric systems, hybrid transmissions, intelligent suspensions, braking systems, gear box, turbochargers, etc.

Through close cooperation and great communication with clients, especially in meeting their personalized process hole sealing and fluid control needs, HC company can achieve accurate analysis and testing through various flow simulation software and powerful professional knowledge.

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For Sealing And Fluid Control

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| Keynote Speaker

Prof. John Zhou
University of Nottingham Ningbo China

Title:

Green Automotive Mobility: Vehicle Emissions Control in the Age of EV

Abstract:

Vehicle emissions remain as the key source of air pollution in urban environment globally, which have caused significant adverse human health effects such as lung cancers and premature deaths. As vehicle emissions are mobile, and catching high-emitting vehicles on the spot has been the challenge of ensuring effective urban air pollution control. In this talk, I will introduce the major methods for the real-world measurement of vehicle emissions, including their advantages and disadvantages. Then I will present our recent research in developing a detection method based on remote sensing for the rapid measurement of real-driving vehicle emissions on the road. Through laboratory calibration, static and dynamic loading testing, to real world application, the remote sensing method has been developed as a tool for the legislative control of vehicle emissions in Hong Kong, which is the world's first such full-scale application. The work involved vehicles powered by different fuels, including diesel, petrol, natural gas and hybrid. As a result of this innovative tool, remote sensing approach has helped to reduce the percentage of high-emitting vehicles, fleet average emissions, roadside and ambient pollutant concentrations, hence ensuring better air quality in Hong Kong.

Biography:

Professor Zhou majors in Environmental Engineering, with a PhD degree from the University of Manchester, UK. He currently serves as the Dean of the Faculty of Science and Engineering at the University of Nottingham Ningbo China. Prior to joining UNNC, he held various leadership positions.

Professor Zhou is a highly regarded scholar in conducting multidisciplinary research in environmental and energy engineering. In vehicle research, he has extensive experience in using remote sensing technology for the rapid detection of vehicle emissions from tailpipes. He has direct experience in the calibration, installation and on-road testing of remote sensing devices; and more importantly, in the application of remote sensing for legislative vehicle emissions control in Hong Kong, which is the first such application worldwide. He has obtained research grants from different organisations worldwide, and successfully supervised 40 PhD graduates. As a leading researcher, Prof Zhou has published 380 papers in renowned international journals, with > 27,000 citations and H-index of 94 in Scopus. Professor Zhou's significant contributions to these areas have earned him national recognition as a top-tier academic and inclusion in the highly prestigious Clarivate "Highly-Cited Researchers", and ScholarGPS "Top 0.05% Scholars Worldwide".

Professor Zhou is a college/panel member for many funding organisations, including the European Framework Programmes and Horizon 2020, the UK Natural Environment Research Council, the Luxembourg National Research Fund, and National Key Research Program of China.

Prof. Giampaolo Buticchi
University of Nottingham Ningbo China

Title:

Intelligent Electronics for Reliable Green Transportation

Abstract:

This talk explores intelligent electronics for enhancing the reliability and sustainability of green transportation systems. Focusing on power electronics and drives, the discussion begins with reliability engineering, covering failure probability distributions, lifetime requirements, and key research areas. Advanced methodologies such as device lifetime modeling, junction temperature measurements, electro-thermal modeling, Physics-of-Failure based design, and Monte Carlo analysis are examined.

Active thermal control strategies are presented as a means to improve reliability by increasing overload capability, reducing thermal cycles, and balancing thermal stress. Historical developments and modern techniques, such as region-based control and switching frequency manipulation, are discussed. Additionally, cosmic ray failure mitigation and adaptive control for solar events highlight emerging challenges in power electronics.

Finally, the talk concludes with future research opportunities, reinforcing the role of intelligent electronics in advancing reliable and efficient green transportation.

Biography:

Giampaolo Buticchi is currently the Head of the Power Electronics, Machine and Control (PEMC) Research Centre at the University of Nottingham Ningbo China. His research focuses on power electronics for renewable energy system and green transportations. He is author/co-author of more than 360 scientific papers; he is an Associate Editor of the IEEE Transactions on Industrial Electronics and the IEEE Open Journal of the Industrial Electronics Society.

Dr. Buticchi is involved in the major international societies (IEEE, IET, RAeS), he has been organizing tutorials and special session in the relevant conferences and journals related to Power Electronics. He is a recipient of the IEEE-IES David Irwin Early Career Award, three IEEE Best paper awards and two conference best paper awards.

Prof. Xiangyang Xu
Beihang University

Title:

Innovation and Practice of Dedicated Hybrid Transmission Configuration in China

Prof. Karsten Stahl
Technical University of Munich

Title:

Multi-Objective Optimization of Electric Drive Units for Electric Vehicles

Abstract:

The dedicated hybrid transmission (DHT) couples the engine and motors electromechanical to achieve energy conversion and control. The coupling between the engine and motors can be series, parallel, or series-parallel hybrid. Different coupling methods result in different energy efficiency. When enterprises develop dedicated hybrid transmissions, the first thing they need decide is what kind of technical route to adopt, followed by the synthesis of configuration schemes, optimization of design parameters, and engineering development. A comprehensive performance evaluation platform for hybrid systems based on dynamic programming algorithms was set up in the presentation, to provide methods and tools for the selection of hybrid technical routes. Simulation analysis and comprehensive evaluation show that the multi-speed series-parallel hybrid technical route is the most suitable development direction for dedicated hybrid transmissions in China, which mainly rely on electric drive. Series-parallel dedicated hybrid transmissions with 2/3/4 gears developed in China were introduced. Actual vehicle test data shows that cars equipped with multi-speed series-parallel dedicated hybrid transmissions have significantly better power performance and economy performance than cars equipped with series, power split, and single speed series-parallel hybrid models.

Biography:

Prof. Xiangyang Xu, PhD. Bachelor's and Master's degrees in Vehicle Engineering from Beijing Institute of Technology in 1987 and 1990, PhD in Mechatronic Engineering from Harbin Institute of Technology in 1999. Worked at the School of Automotive Engineering, Harbin Institute of Technology from 1990 to 2002, and as a visiting scholar at Daimler Benz AG from July 1998 to December 1999. From September 2002 to present, Professor at the School of Transportation Science and Engineering, Beihang University, Executive Deputy Director of the National Passenger Vehicle Automatic Transmission Engineering and Technology Research Center, and Fellow of the China SAE. Professor Xu has long been engaged in theoretical and engineering technology innovation and industrialization of automatic transmissions for vehicles. He has led the development of the world's first front wheel drive 8-speed automatic transmission (8AT) and its series of products, and won the first prize of National Science and Technology Progress Award (first author) in 2016. His main research interests: Vehicle automatic transmission theory and control technology, hybrid transmission technology, and electric drive technology.

Abstract:

Electric drive units (EDUs) are core components of battery electric vehicles, combining power electronics, electric machines, and transmissions. Their design involves a wide range of choices — from motor types (ASM, EESM, PSM) to transmission architectures (layshaft or planetary, single- or multi-speed). These decisions strongly influence key performance indicators such as NVH, efficiency, and power density. The growing trend toward very high-speed electric machines adds further complexity to the design process.

At FZG, several research projects tackle these challenges. In the Speed2E and Speed4E projects, high-speed EDU concepts with input speeds of up to 30,000 and 50,000 rpm and dual-motor layouts were developed, achieving up to 90% higher power density compared to reference systems. Innovative thermal management approaches using water-containing fluids were also explored.

The ongoing OPT4E project brings together seven industrial and four academic partners to develop a digital methodology for multi-objective EDU optimization. Building on previous work and validated test data, a cross-domain software tool is being developed to accelerate EDU development and to support design decisions across motors, transmissions, and power electronics.

This keynote will present the OPT4E methodology and key results, demonstrating how integrated digital approaches can unlock new performance potential for next-generation electric powertrains.

Biography:

Professor Karsten STAHL studied mechanical engineering at the Technical University of Munich (TUM) and served as a research associate at the Gear Research Centre (FZG) at TUM and received his Ph.D. degree (Dr.-Ing.). Then, he worked 10 years for BMW in different positions. He was head of the group "Prototyping, Gear Technology & Methods" in Dingolfing, department leader "Validation Driving Dynamics and Powertrain" at the MINI plant in Oxford, and Manager for "Predevelopment and Innovation Management" within BMW Driving Dynamics and Powertrain in Munich.

Since 2011 Prof. Stahl is head of the Institute for Machine Elements and director of the Gear Research Center (FZG) at TUM and since 2024 he is also head of the Department of Mechanical Engineering at the School of Engineering and Design of TUM.

The focus of his research is experimental and analytical investigations of endurance, tribology, NVH, materials, and condition monitoring on gears, transmission components, and drive systems, targeting to develop methods and tools for the reliable determination of fatigue life, efficiency, and vibration characteristics.

Prof. Stahl is the author of several hundred scientific publications, member of many scientific boards and associations, convenor of DIN and ISO working groups, editor of scientific journals, and chairman of different scientific conferences, including president of the VDI International Conference on Gears.

Prof. Qingkai Han
Northeastern University

Title:

Intelligent Condition Monitoring and Fault Diagnosis Technology for Micro-turbines with Multi-Physical Field Fusion

Abstract:

Micro-turbine systems (for example turbochargers, turbo-ventilators, and turbo-expanders) serve as critical components in new energy power and distributed generation systems, with widespread applications in transportation and various industries. Their rotating components, particularly rotor blades and bearings, operate continuously under extreme conditions involving high temperature, pressure, and rotational speed. This leads to high failure risks and severe consequences, necessitating robust fault early-warning, condition monitoring, and diagnostic strategies. Three major challenges persist: the low signal-to-noise ratio of vibration signals under unstable airflow and complex loading conditions, the diversity and complex mechanisms of failure modes in both blades and bearings, and a severe scarcity of fault samples available for data-driven model training.

To address these challenges, this talk presents an integrated approach for the high-precision diagnosis and prediction of multiple fault modes. For bearing condition monitoring, a configuration of high-frequency acceleration and tachometer sensors is employed. We utilize time-frequency domain analysis techniques, including Fast Fourier Transform (FFT) and Envelope Spectrum analysis, to extract fault-related features. Diagnostic models based on expert systems, Principal Component Analysis (PCA), and Support Vector Machines (SVM) have been developed to accurately classify the type, severity, and location of bearing faults. Furthermore, an algorithm analyzing the rate of change of characteristic parameters enables trend analysis and early-stage fault prediction.

For blade condition monitoring, we innovatively leverage acoustic pressure signals for synchronous speed and temperature tracking. A high-precision measurement method for blade tip clearance and vibration has been developed using a capacitive sensor and a Gaussian fitting algorithm. The introduction of bearing vibration order spectrum entropy significantly improves fault identification capability under variable-speed conditions. Additionally, fractal theory is applied to extract nonlinear features from blade temperature signals, facilitating early fault warning. Experimental validation demonstrates that the proposed approach achieves a fault identification accuracy of up to 98% across a wide speed range of 0–20,000 rpm, effectively diagnosing various faults under both stable and unstable airflow conditions.

Furthermore, a newly developed bleed-air refrigeration unit will be introduced. The integrated diagnostic approach presented is not only applicable to micro-turbines but also offers a practical set of techniques for advancing predictive maintenance in high-end equipment manufacturing. This work contributes positively to enhancing the reliability of energy systems within the framework of carbon peak and neutrality goals.

Biography:

Prof. Qingkai Han is a Professor at the School of Mechanical Engineering and Automation, Northeastern University, Shenyang, China. He holds a PhD in Mechanical Engineering, with research expertise spanning machinery dynamics, rotor dynamics, nonlinear vibration, condition monitoring, and PHM. He has undertaken multiple projects under national key research and development plan of China, National Natural Science Foundation of China. His research has been successfully applied in industrial settings, earning over 10 national/provincial/ministerial awards, 20+ patents, 7 published books, and 200+ academic papers.

Prof. Han currently serves as Director of the Mechanical Reliability and Dynamics Research Center at Northeastern University, Director & Executive Director of the Rotor Dynamics Committee of Chinese Society of Vibration Engineering, and holds memberships in the Nonlinear Vibration Professional Committee, Mechanical Design Branch of Chinese Mechanical Engineering Society, Nonlinear Dynamics Professional Committee of Chinese Society of Mechanics, and as Standing Director of the Fault Diagnosis Branch of China General Machinery Association.

Prof. Christos Papadopoulos
National Technical University of Athens

Title:

Marine Shaftline Monitoring and Bearing Condition Prognostics: From Model Development to Laboratory and In-Service Validation

Abstract:

This work introduces our work at the National technical University of Athens related to the development of a Digital Twin Framework for real-time marine shaftline monitoring and bearing condition prognostics.Leveraging a hybrid of AI and physics-based models, the system's primary objective is to accurately estimate bearing loads, predict abnormal system operation, and identify impending failures without invasive bearing and shaft sensors, with the goal of enhancing propulsion safety and reliability. The framework integrates shaft alignment theory and multiphysics bearing simulations with machine learning algorithms to generate a dynamic virtual representation of the propulsion system. This high-fidelity digital twin may be used to provide continuous, predictive insights into structural health across diverse operational conditions, forming the basis for advanced predictive maintenance strategies. The framework has been systematically developed and validated through the i-Marine and S-PRISMoID research projects, which established small- and medium-scale experimental facilities and a physical twin of an in-service vessel. This multi-stage process enabled rigorous testing, moving from controlled laboratory settings to real-world pilot applications, confirming the model's fidelity and practical applicability. Looking forward, the strategic roadmap focuses on transitioning this technology from research to industrial adoption. Our priorities focus on validation of the framework's robustness and scalability across different vessel types, sizes and operational profiles. Subsequent steps involve developing standardized monitoring protocols for industrial integration and collaborating with classification societies to achieve regulatory acceptance. The present initiative aims to deliver safer, more reliable, and more efficient marine propulsion systems for the next generation of smart maritime assets.

Biography:

Christos Papadopoulos is a Professor at the School of Naval Architecture & Marine Engineering of the National Technical University of Athens. He joined the faculty of the Department in 2007. He holds a Diploma in Naval Architecture & Marine Engineering (1997) and a Ph.D. in Marine Engineering (2001), both from NTUA. His research activities include hydrodynamic lubrication of journal and thrust bearings using Computational Fluid Dynamics (CFD), effects of artificial surface texturing on the performance of lubrication contacts, dynamics of marine propulsion and power transmission systems, shaft alignment of marine propulsion systems, numerical simulation of sound propagation and sound-structure interaction, and modeling and identification of dynamical systems, with emphasis on coupled structural acoustic systems. He teaches Mechanical Drawing, 3-D Computer Aided Design, Machine Elements, Ship Propulsion Systems, Ship Auxiliary Systems and C++ Programming. He serves as a regular reviewer of about 20 journals in the fields of Marine Engineering, Tribology, and Vibrations/Acoustics.

His research work includes more than 85 peer-reviewed publications in journals and international Conferences; it has received over 1200 citations. He has received the Best Paper Award by the Microturbines & Small Turbomachinery Committee of the American Society of Mechanical Engineers (ASME) in June 2010, and a Scientific Award for Excellence by the Greek Ministry of Education in December 2012. He has participated in several research projects funded by the EU, the Greek Government and the industry. He has long experience as a consultant to the Maritime Industry, in the field of marine engineering, with emphasis on shaft alignment calculations/measurements, FEM/CFD analyses, vibration and acoustics measurements and calculations. He has been involved as a technical expert in more than 20 cases of accidents/failures of mechanical components or systems in the maritime industry.

University of Nottingham
UK | CHINA | MALAYSIA

TaiKang East Road 泰康东路

GATE 1
GATE 2
GATE 3
GATE 4

Nottingham Lake

LA Hotel

Nottingham River

QianHu South Road 钱湖南路

Academician Park Phase II 院士公园二期

On Planning

DB Building

Canghai South Road 沧海南路

G15 Express Way 沈海高速（甬台温）

High Street 商业街

YinZhou Avenue 鄞州大道

Legend

Fire assembly point	紧急疏散合合点	
Building entrances	建筑入口	
Clinic	诊所	
Reception	问询处	
Bank of China	中国银行	
Accessible Toilet	无障碍卫生间	
Accessible Entrance	无障碍出入口	
Bus stop	公交车站	
Underground Station	地铁站	
Bicycle parking	自行车停放处	
Car parking	机动车停车场	
Basement parking	机动车地下停车场	
Academic buildings	教学办公建筑	
Residences	宿舍公寓	
Other services	其他服务	

Building		No.
Trent Building (TRENT) 行政楼		1
Student Recruitment and Admission Office 招生办		A
UNNC Museum 校史馆		B
The Sir Peter Mansfield Building (PMB) 理工楼		2
YANG Fujia Building 杨福家楼		3
Auditorium 思源报告厅		4
The Portland Building (PB) 学生服务楼		5
The Hub 学生服务中心		C
Li Dak Sum Yip Yio Chin Kenneth Li Library 李达三叶耀珍俪李本俊图书馆		6
Staff Hotel 教师宾馆		7
LA Hotel 博雅国际交流中心		D
Student Canteen 学生餐厅		8
Villas 别墅		9,10
Student Residences 学生宿舍		11-20, 22.
Residential Hub 生活驿站		E
The Third Canteen 第三餐厅		F
The Third Space 第三空间（四食堂）		G
Sir Colin Campbell Building (Sports Centre) 体育馆		21
Residence 宿舍楼		23
Health and Wellbeing Centre 身心健康中心		H
The Lord Dearing Building (DB) 新教学楼		24
The D.H. Lawrence Auditorium (New Audi) 新报告厅		25
New International Conference Centre (NICC) 新国际会议中心		26
Staff Apartments 教师公寓		28
Sir David and Lady Susan Greenaway Building (IAMET) 海洋经济研究院		29
Innovation and Enterprise Building (IEB) 国际创新创业大楼		30
International Conference Centre (ICC) 国际会议中心		35
Outdoor Sports Facilities 室外运动场地		37
Ornamental Gardens 公园		38

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