



The 44th DCEA International Automotive Conference

底特律中国工程师协会第44届国际汽车技术研讨会

Advances & Challenges of Auto Industry

机遇与挑战：汽车工业的最新进展



Venue: Plymouth Manor, 345 North Main St., Plymouth MI 48170

Time: 4:30 p.m. – 9:00 p.m.

Date: April 18, 2024 (Thursday)

Dining: Banquet

Dress Code: Business Formal

Conference Committee

会议组织委员会

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Agenda

4:30 – 5:00 PM **Check-in and Networking**

5:00 – 5:05 PM **Opening & Welcome**

Presentations: Session 1 (5:05 – 6:45 PM) *Session Chair: Nina Hughes*

5:05 – 5:45 PM **Keynote: The Road to Better**
Bob Holycross, VP and Chief SES Officer,
Ford Motor Company

5:45 – 6:15 PM **The Challenges and Strategies of Vehicle Electrification and Applications of AI for Improving Vehicle Performance**

Dr. Perry Gu (Chief Scientist) & Mr. Ben Wei (Sr. Chief Engineer)
Zhejiang Geely Holding Group Co., Ltd.

6:15 – 6:45 PM **State of Energy Solutions**
Tim DeBastos
Head of NA Battery Development of LG Energy Solution

Dinner (6:45 – 7:40 PM)

7:05 – 7:15 PM **VIP Acknowledgements & Distinguished Speeches**
- Charles Poon, Director, Ford Electrified Systems Engineering
- Jenny Wang, APACC Board director, Generation Optimization Director, DTE Energy
- Molly Mo, Global Co-Chair, Ford Asian Association

7:15 - 7:30 PM **DCEA Annual Report**
Dr. Walter Zifeng Nie, DCEA President

7:30 - 7:40 PM **Acknowledgements & Appreciation**

Presentations: Session 2 (7:40 – 9:00 PM) *Session Chair: Jun Wang*

7:40 – 8:10 PM **Enhancing Battery Thermal Management in EVs through Reduced Order Modeling and Predictive Control for Quick Charging**
Dr. Bruce Hu, Global Engineering Director
Farasis Energy USA

8:10 – 8:40 PM **Learning-based Decision and Control Systems for High-level Self-driving Intelligence**
Prof. Shengbo Eben Li, Dean of Vehicle & Mobility School
Tsinghua University (*via Zoom*)

8:40 - 9:00 PM **Group Pictures & Closing**

Preface



It is a profound honor to welcome every one of you to the 44th Detroit Chinese Engineers Association—DCEA International Automotive Conference! Your expertise and contributions to the industry are invaluable, and your presence here today is a testament to the importance and relevance of this event. Last year, we resumed this traditional annual meeting in person after three years of online activities. I am thrilled that we can once again engage in face-to-face communication.

The DCEA, established over 40 years ago by passionate engineers, has been a beacon of innovation and networking in the automotive industry. Our mission is to create a community that promotes technology and innovation and lives and breathes it. We enhance the networking of engineers of all ethnic backgrounds, fostering a rich and diverse environment. A decade ago, we expanded our horizons to provide global networking opportunities and disseminate career information and business opportunities to benefit our members and sponsors. We also champion the value of cultural diversity in society by supporting local communities. Your participation in this conference is a testament to the resounding success of our mission.

Detroit's automotive industry is at the forefront of the most significant technological transformation since its inception. Our community and society grapple with enormous, vast, and complex problems. In addition to the technological revolution, competitive pressures brought on by markets demand hardware to be launched at the speed of software. This presents us with untapped potential. The car development process as we know it today will be different! It will ultimately augur mobility and connectivity with optimized electrification. It will be smart enough to anticipate your preferences and behaviors while being green and energy-efficient. The challenges to engineers in the Detroit area are enormous, and of course, the available opportunities are also plentiful. We live and work in a complex, uncertain, yet exciting time.

With these in mind, we carefully chose this year's theme for the conference to cover electrification and clean-energy cars, with top experts and leaders to share their knowledge and expertise in this field to bring us more interactive brainstorming and idea exchanges.

This event results from many voluntary hours of the DCEA board, advisors, Tech Council, and invited speakers. We appreciate their dedication to making this happen. I hope everyone will enjoy and benefit from this event. Let us work together to support DCEA's future and make it a long-term platform for collaboration.

Thank you for your continued support, and I wish you a wonderful experience today!

A handwritten signature in blue ink, appearing to read "W. Nie".

Walter Z. Nie, PhD

President, DCEA

Keynote:

The Road to Better

Speaker: Bob Holycross

Vice President, Chief Sustainability, Environment and Safety Officer

Ford Motor Company



As Ford's Vice President, Chief Sustainability, Environment and Safety Officer, Bob Holycross leads a global team responsible for developing and implementing the company's sustainability strategy and is responsible for its global policies and performance related to the environment, human rights and product safety. He is deeply committed to Ford's overarching purpose – building a better world where every person is free to move and pursue their dreams – and is proud to be playing a key role in helping the company reach its ambitious goal to lead the electric vehicle revolution and achieve carbon neutrality across its vehicles, facilities and supply chain by 2050.

Abstract:

Accelerating our Progress: progressing towards a carbon neutral transportation system with hybrid and electric vehicles.

Sourcing for Sustainability: ensuring a responsible supply chain.

Greening the Grid: partnering with utilities to increase renewable energy.

Just Transition: providing opportunities to upskill and reskill through supportive training programs.

Presentation:

The Challenges and Strategies of Vehicle Electrification and Applications of AI for Improving Vehicle Performance

Speaker: Dr. Perry Gu (Chief Scientist) & Mr. Ben Wei (Sr. Chief Engineer)

Zhejiang Geely Holding Group Co., Ltd.

Dr. Perry Gu is a Chief Scientist of Geely Innovation Center of Geely Holding Group, responsible for identifying new technology frontiers, discovering new techniques, and leading the development and commercialization of new technologies. He is an expert in Vehicle NVH, Computer Aided Engineering, Mechanical Dynamics.

Mr. Ben Wei is a Sr. Chief Engineer of Vehicle Dynamic Control with Geely Automotive R&D Center. He devoted the whole last decade to pioneering industry-new cross-ECU complex vehicle functions, especially combining XYZ control (X: accel & decel, Y: steer, Z: suspension) with AI learning.



Abstract:

The automotive market in China has gradually grown into the largest market in the world over the last 10 years, sale volume reaching 26 million in 2023. Through the efforts of Chinese domestic OEMs, with the help of many well-known world-class engineering consultant firms, research institutes and universities, the vehicle performance of Chinese domestic vehicles has reached the competitive levels of famous global automotive OEMs vehicles.

In this talk, two themes of affecting vehicle performance are presented: 1) EV NVH challenges and countermeasure strategies as well as the future directions of NVH technology development; 2) Evolvement of vehicle dynamic engineers with & enhance AI drive to achieve high-level AI drive for better vehicle performance.

Presentation:

State of Energy Solutions

Speaker: Tim DeBastos, Head of NA Battery Development of LG Energy Solution



Timothy DeBastos is the Head of Battery Development at LG Energy Solution based in Troy Michigan. He leads development for pack, module, cell, test & validation, & BMS engineering as well as organizational business performance.

Abstract:

In the realm of electric vehicles (EVs), high-level battery technology trends are reshaping the landscape. As key players like LG Energy expand their footprint and unveil ambitious growth plans, they are driving innovation in lithium-ion batteries. Despite these advancements, pain points persist, hindering widespread EV adoption. Challenges such as range anxiety, high initial costs, and lengthy charging times underscore the need for collaborative efforts to overcome barriers to EV proliferation.

In this presentation, Tim will address the following topics:

- high-level battery technology trends
- LG Energy footprint and growth plans
- Pain points for EV proliferation

Presentation:

Enhanced Battery Thermal Management in EVs through Reduced Order Modeling and Predictive Control for Quick Charging

Speaker: Dr. Bruce Hu,

Senior Development Engineer, Farasis Energy USA

Qiu hao Hu is currently working as a Senior System Modeling Engineer at Farasis Energy USA. He received his Ph.D. degree from the University of Michigan, Department of Naval Architecture and Marine Engineering in 2022, and his master's and bachelor's degrees from Shanghai Jiaotong University in 2018 and 2015, respectively. His research interests are battery management strategy, integrated power and thermal management of electrified vehicles, real-time optimal control, and intelligent transportation.



Abstract

In the realm of electric vehicles (EVs), effective battery thermal management is critical to avert thermal runaway, overheating, and extend the operational lifespan of batteries. The process of designing thermal management systems can be substantially expedited through the utilization of modeling and simulation techniques. However, the high-fidelity 3D computational fluid dynamics (CFD) simulations often demand significant computational resources to provide comprehensive results under varying conditions. In this paper, we develop a reduced order model (ROM) to capture the battery thermal dynamics employing a sub-space method. To construct this ROM, we use high-fidelity CFD simulations to generate step responses of battery temperature with respect to the heat generation and cooling power. These step responses are subsequently used as training data for the ROM. To minimize computational expenses while preserving accuracy, we determine the minimal dimensionality of the ROM through the analysis of the singular values of the oblique projection matrix. To assess the accuracy and reliability of the developed ROM, a comprehensive comparison is conducted between ROM results and both CFD solutions and experimental data, specifically in a quick charge scenario. The ROM exhibits good agreement with both CFD and experimental results. Furthermore, a novel predictive control strategy is developed to enhance battery thermal management by leveraging the ROM-derived predictive information for real-time adjustments to the cooling setpoint. The predictive control approach leads to a reduction in total charging time, achieving an improvement of up to 9.9% compared to a baseline case with a constant cooling setpoint. Furthermore, the developed predictive control strategy outperforms traditional feedback control systems that rely solely on current state information.

Presentation:

Learning-based Decision and Control Systems for High-level Self-driving Intelligence

(via Zoom)

Speaker: Prof. Shengbo Eben Li

Tsinghua University



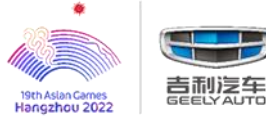
Shengbo Eben Li received his M.S. and Ph.D. degrees from Tsinghua University in 2006 and 2009. Before joining Tsinghua University, he worked at Stanford University, University of Michigan, and UC Berkeley. His active research interests include intelligent vehicles and driver assistance, deep reinforcement learning, optimal control and estimation, etc. He is the author of over 190 peer-reviewed journal/conference papers, and co-inventor of over 40 patents. Dr. Li has received over 20 prestigious awards, including Youth Sci. & Tech Award of Ministry of Education (annually 10 receivers in China), Natural Science Award of Chinese Association of Automation (First level), National Award for Progress in Sci & Tech of China, and best (student) paper awards of IET ITS, IEEE ITS, IEEE ICUS, CVCI, etc. He also serves as Board of Governor of IEEE ITS Society, Senior AE of IEEE OJ ITS, and AEs of IEEE ITSM, IEEE TITS, IEEE TIV, IEEE TNNLS, etc.

Abstract:

Today's autonomous driving systems are facing severe challenges in highly dynamic, random and dense traffic scenarios. Existing hierarchical design methods, for example, that with rule-based decision and linear motion controllers, lack sufficient adaptability and flexibility. As a biologically inspired artificial intelligence, reinforcement learning (RL) is promising to provide the self-evolving ability for automated cars, which has the potential to generalize to unknown driving scenarios. This talk will discuss recent advances in learning-based autonomous driving systems for high-level self-driving intelligence. An interpretable and computationally efficient framework, called integrated decision and control (IDC), is proposed to fulfill more flexible functionality, in which the standard actor-critic architecture can be subtly utilized to train its decision and control neural networks. Some technical breakthroughs in safe reinforcement learning and high-fidelity simulators are also discussed for the purpose of training more accurate neural network controllers.

Sponsorship & Support Acknowledgement

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吉利汽车研发中心成立于 2003 年，是吉利控股集团 5 大全球工程研发中心之一，是吉利汽车产品输出和“技术领先”战略的动力源泉。其坐落于宁波市杭州湾，地处上海、杭州、宁波的几何中心，四通八达，两小时交通圈，覆盖长三角。

目前，吉利汽车研发中心拥有国内目前最先进的研发技术中心、验证中心及其生活配套措施，集设计研发、试验试制、质量控制、供应商协同开发于一体，能够进行汽车关键零部件试验和总成试验，新能源电机的性能试验、底盘耐久试验、整车分析评价、结构研究及测量等。

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- Promote cultural awareness and the value of diversity in society
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Activities and Events (主要活动)

Forums/ Symposiums/Conferences:

- Global Automotive Forum (全球汽车精英论坛)
- Annual International Technology Conference (DCEA 年度国际技术大会 - 每年4月)
- Fall Automotive Symposium (DCEA 秋季汽车技术专题研讨会)
- Other Special Symposium or Forum (其他专题研讨会及论坛)

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