Academic Corner
Hang Su

In this issue, we interview IEEE SMC member **Dr Huadong Mo**, an Associate Professor (effective from 01 Jan 2026) in the Discipline of Systems Engineering at the University of New South Wales (UNSW), Australia. He received his B.E. degree in Automation from the University of Science and Technology of China in 2012 and a Ph.D. in Systems Engineering and Engineering Management from the City University of Hong Kong in 2016.

From 2016 to 2019, he served as a Research Associate at the Reliability and Risk Engineering Laboratory, ETH Zurich, where he worked on modelling, uncertainty, and reliability analysis of complex energy and industrial systems. He joined UNSW in 2019 as a Lecturer and has been a Senior Lecturer since 2021. He currently serves as the Postgraduate Coordinator for Systems Engineering and leads the Battery Safety and Sustainability Group within the UNSW Battery Ecosystem.

Dr Mo's research is anchored in **AI for Energy**, with a strong emphasis on **battery health prediction, online monitoring, safety diagnostics, and intelligent pathways for second-life evaluation and recycling**. His work integrates machine learning, cyber–physical modelling, and data-driven decision tools to enhance reliability across the battery lifecycle. Beyond batteries, he contributes to **energy resilience**, including PV–ESS–EV coordination, secure and data-driven operation of cyber–physical energy systems, and AI-enabled forecasting and optimisation frameworks. He maintains active collaborations with industry and international partners to translate intelligent algorithms into practical, sustainable energy technologies.

(1) Please tell us a bit about yourself and your academic/professional background.
I am an Associate Professor (effective 01 January 2026) in the Discipline of Systems Engineering at the University of New South Wales (UNSW) in Canberra, where I also coordinate the postgraduate Systems Engineering program. I received my B.E. in Automation from the University of Science and Technology of China and my Ph.D. in Systems Engineering and Engineering Management from the City University of Hong Kong. From 2016 to 2019, I worked as a Research Associate at ETH Zurich in the Reliability and Risk Engineering Laboratory.

My research focuses on AI for Energy, including battery health prediction, online monitoring, safety diagnostics, and intelligent recycling. I also work on energy resilience, PV–ESS–EV coordination, and data-driven optimisation of cyber–physical energy systems. I lead the Battery Safety and Sustainability Group within the UNSW Battery Ecosystem and collaborate closely with industry and international partners to translate intelligent algorithms into reliable and sustainable energy technologies.

(2) Are there any underexplored opportunities that you find particularly exciting in this field?
There are several underexplored opportunities in AI for Energy, especially around batteries and resilient energy systems. One area that genuinely excites me is the move toward low-history or history-free battery diagnostics. If we can reliably assess battery health without long-term cycling data, it will make second-life assessment faster, cheaper, and far more scalable across industry.

Another promising space is full-lifecycle intelligence. At the moment, data across manufacturing, operation, second-life use, and recycling are treated in isolation. Building AI methods that connect these stages could unlock safer, longer-lasting batteries and reduce waste at a national scale.

I also see strong potential in AI-enabled resilience for cyber-physical energy systems. Combining forecasting, control, and anomaly detection to support PV–ESS–EV integration under uncertainty will be essential as Australia moves towards higher renewable penetration. Approaches that blend physics-based insight with data-driven learning will be crucial for trustworthy, real-world deployment.

(3) Where do you see the field going in the next 5–10 years?
Over the next decade, I expect AI for Energy to become far more integrated into the way we manage, assess, and secure distributed energy resources. For batteries, we will likely see standardised data pipelines and regulatory frameworks that support AI-driven health prediction, safety monitoring, and second-life assessment. This will make data sharing and large-scale model training much more practical across the industry.

I also see rapid progress in physics-guided and uncertainty-aware models. Purely data-driven methods will give way to hybrid approaches that embed electrochemical and power-system knowledge, enabling more trustworthy predictions that can be used directly in market operations, grid planning, and control.

At the system level, the push towards high renewable penetration will make PV–ESS–EV orchestration a central challenge. AI will support real-time coordination, resilience under extreme events, and adaptive responses to cyber-physical disturbances.

Finally, recycling and circular-economy pathways will become a major focus. AI will play a key role in automatic condition assessment, sorting, and lifecycle optimisation, helping Australia manage growing volumes of energy-storage assets in a safe and sustainable way.

(4) How has your experience across academia and industry shaped your research?
My experience across academia and industry has shaped my research in very practical ways. Working in academic environments such as ETH Zurich and UNSW gave me a strong grounding in modelling, uncertainty, and system-level thinking. These settings encouraged me to ask fundamental questions about how energy and cyber-physical systems behave, and how learning-based methods can reveal patterns that are difficult to capture with traditional models.

Industry engagement added a different layer entirely. Collaborating with battery manufacturers, recycling companies, and energy-sector partners exposed me to real data, real operational constraints, and the urgency of actionable solutions. Many of the problems we work on, battery health prediction, safety diagnostics, second-life assessment, and grid–storage coordination, only make sense when informed by industry needs and field conditions.

The combination of both worlds has pushed my work towards AI methods that are technically rigorous but deployable, able to cope with sparse data, evolving operating environments, and safety requirements. It has also reinforced the value of long-term collaboration, where research outcomes directly influence practice and, in turn, industry challenges help define the next set of research questions.

(5) What advice would you give young researchers entering your field?
My main advice is to stay curious and stay practical. AI for Energy is moving quickly, and the most impactful work often sits at the intersection of disciplines. Build a strong foundation in data, modelling, and systems thinking, but also make the effort to understand how real batteries, power systems, and energy markets operate. That context will shape better research questions and help you see where your work can genuinely make a difference.

Do not be afraid of messy data or imperfect systems - they are a feature of this field, not a flaw. Learning how to extract reliable insights from incomplete or noisy information is a valuable skill.

I also encourage young researchers to engage early with industry and international collaborators. These connections help you appreciate emerging challenges and often open doors to unique datasets and practical deployment opportunities. Finally, be patient with yourself. This is a complex field, and progress comes from consistent, thoughtful work rather than quick wins.

(6) How important is international collaboration in advancing research, and how can young academics engage in it?
International collaboration has been essential in shaping the direction and impact of my work. Energy systems, battery technologies, and AI methods evolve at different speeds around the world, and no single country holds all the expertise or all the data. Working with groups in Europe, Asia, and the United States has given me access to new perspectives, complementary skill sets, and problem contexts that simply do not exist locally. These collaborations often lead to ideas that neither side would have developed alone.

For young academics, the first step is to be proactive. Reach out to researchers whose work genuinely interests you, even if you have never met them. A short, thoughtful email can open unexpected doors. Small opportunities, such as joint workshops, online seminars, student exchanges, and seed-funded projects, often grow into long-term partnerships. It is also helpful to engage with international conferences and technical committees, which provide a natural way to build your network and stay visible.

Most importantly, approach collaboration with a mindset of contributing rather than just receiving. Shared problems, shared datasets, and shared goals are what sustain partnerships and create research that has global relevance.

(7) What role has IEEE and IEEE SMC played in your career?
IEEE, and particularly the IEEE Systems, Man, and Cybernetics Society, has played a significant role throughout my career. It provided me with a community that values systems thinking, rigorous methodology, and the practical integration of computation and engineering—principles that strongly influence my work in AI for Energy. The publications, conferences, and technical committees within IEEE SMC helped shape my research direction and gave me a platform to engage with researchers tackling similar challenges across different domains.

Being part of IEEE SMC has also offered opportunities for leadership and service. Chairing the IEEE SMC ACT Chapter and contributing to editorial and committee roles have helped me build professional networks, refine my understanding of research trends, and support younger researchers entering the field. Importantly, IEEE has connected me with international collaborators whose expertise complements my own, enabling joint projects on battery health, energy resilience, and cyber–physical systems.

For me, IEEE has been more than a professional society; it has been a reliable space for exchange, collaboration, and long-term growth.