IET International Travel Award

Calvin Tsay, Lecturer in Computing, Imperial College London

I am very grateful to the IET for the International Travel Award, which supported my attendance at two international conferences in the USA this October. The conferences were conveniently timed to occur on consecutive weeks, allowing me to maximise the impacts of long-haul travel:

The INFORMS Annual Meeting brought together more than 6,000 INFORMS members, students, prospective employers and employees, and academic and industry experts to share the ways operations research and analytics are fueling "smarter decisions for a better world." The 2024 meeting was held in Seattle, Washington from 20-23 October 2024. The AIChE Annual Meeting is the premier educational forum for chemical engineers seeking innovation and professional development. The 2024 edition was held in San Diego, California from 27-31 October 2024, and featured over 760 sessions and 6,000 papers.

I completed my training in the USA, and attending these conference helps maintain my involvement in the American scientific communities, e.g., to build a network of collaborators. I was elected by the Computing and Systems Technology (CAST) division of AIChE as programming director for 2026; attending the AIChE Meeting in 2024 allows me to stay involved in this community, as well as to begin contributing to the programming discussions. Moreover, a presentation I am co-author of, entitled *"Scalable Global Optimization of Gaussian Processes Using a Specialized Branch-and-Bound Algorithm"* was selected as a CAST Division Plenary talk, and this presentation led to several follow-on discussions with the broader research community. A second presentation *"Multistep Lookahead Bayesian Optimization for High Dimensional Black-Box Optimization Problems Using Reinforcement Learning"* was given by a visiting PhD student to my group and highlighted the results of our collaboration.

I was invited by Prof Zelda Zabinsky (University of Washington) to give a presentation at the INFORMS Annual Meeting, entitled "Embedding ReLU Neural Networks in Dynamic Optimization: Scaling Mixed-Integer Formulations Using Bounds Propagation." This recognition in an invited session helped ensure that my presentation at INFORMS was well recognised. My talk received positive feedback and led to many discussions in the ensuing q&a session.

Both conferences contained an array of powerful keynote talks. The AIChE Annual Meeting had several major keynote lectures including the Danckwerts Lecture entitled "The Confluence of Kinetic Modeling and Data Science: Reaction Pathway Analysis of

the Conversion of Macromolecules," delivered by Linda Broadbelt from Northwestern University. The INFORMS Annual Meeting included inspiring talks such as "How OR Helps the United Nations Deliver Food and Hope" from Koen Peters at the World Food Programme. I was also able to attend student presentation award sessions at both conferences, where I was inspired by the up-and-coming researchers in optimisation and chemical engineering.

A significant component of my attendance at these conferences is the networking opportunities afforded. In particular, I had opportunities to connect with researchers both in academia (including at MIT, Columbia, UPenn, etc.) and in industry (including at Nike, New England ISO, Amazon, etc.). These initial meetings have already led to initial research discussions and drafting of collaborative research grants since my return to Imperial College.

Finally, I was able to attend the editorial board meeting of the journal *Computes & Chemical Engineering*, where I was able to accept the 2023 Best Paper award on behalf of my collaborators in both academia and industry. This prestigious journal in process systems engineering rated the paper as the best of over 280 published that year. The paper was led by former PhD student Jose Pablo Folch and colleagues from BASF and Imperial. The work adapts classical statistical techniques used to obtain the most useful possible information from a finite number of experiments to the specific research and development (R&D) methods used by chemical companies.