

# MAE Seminar Series

THURSDAY,

APRIL 1

4:00 PM

Zoom Information

Meeting ID: 983 6137 4638

PASSWORD: MAE2021

## ADVANCED BATTERY MANAGEMENT: MARCHING TOWARD A PROMISED LAND

### ABSTRACT

Lithium-ion battery energy storage is rising as the backbone of various industrial and civilian systems, playing a key role in moving the world into the clean energy era with ever-increasing application in the sectors of electrified transportation, renewable energy and smart grid. Their performance, safety and life critically depends on optimal management. High-performing battery management requires a profound integration of dynamic modeling, control, estimation and optimization. This talk will discuss our recent journey in this emerging field. First, we will discuss the development of battery models with low complexity but high predictive accuracy, along with data-based parameter identification that extracts the models from data on demand. Second, we will present optimal charging control that addresses competing objectives while offering high computational efficiency. Finally, we will consider large-scale battery systems and show the promise of distributed control for overcoming the complexity in managing them. The discussion will further highlight potential opportunities and challenges that may shape the future landscape of this field.

### BIO SKETCH

Huazhen Fang is an Associate Professor of Mechanical Engineering at the University of Kansas, where he joined in 2014 and has led the Information & Smart Systems Laboratory. He received his Ph.D., M.Sc., and B.Eng. from the University of California, San Diego (Mechanical Engineering, 2014), University of Saskatchewan, Canada (Mechanical Engineering, 2009), and Northwestern Polytechnic University, China (Computer Science, 2006), respectively. His research interests lie in control and estimation theory with application to energy management, cooperative robotics and system prognostics. He has received the 2019 National Science Foundation CAREER Award and at the University of Kansas, the 2018 and 2019 Miller Scholar Award for Research Excellence and the 2016 Wesley G. Cramer Outstanding Mechanical Engineering Faculty Award. He has received the awards of Outstanding Reviewer or Reviewers of the Year from Automatica, IEEE Transactions on Cybernetics and ASME Journal of Dynamic Systems, Measurement and Control.



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