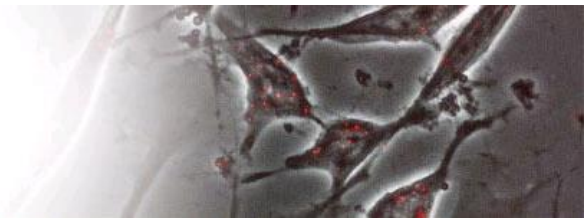
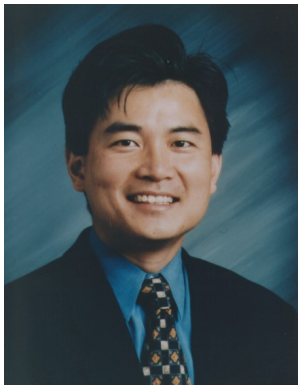
UCLA Engineering

Chemical and Biomolecular Engineering



SEMINARS IN CHEMICAL AND BIOMOLECULAR ENGINEERING



Friday, Dec. 14, 2018
10:00am - 11:00am
Boelter Hall 8500 (Penthouse)

Jay H. Lee

Professor
Chemical & Biomolecular Engineering
Korea Advanced Institute of Science & Technology

"Reinforcement Learning – Overview of Recent Progress and Potential Applications for Process Systems Engineering"

This seminar provides a brief introduction to Reinforcement Learning (RL) technology, summarizes recent developments in this area, and discusses their potential implications for the field of process systems engineering. The paper begins with a brief introduction to RL, a machine learning technology that allows an agent to learn, through trial and error, the best way to accomplish a task. We then highlight two new developments in RL that have led to the recent wave of applications and media interest. A comparison of the key features of RL vs. Model Predictive Control (MPC) and other traditional mathematical programming based methods is then presented in order to clarify their relative merits and shortcomings. This is followed by an assessment of areas that RL technology can potentially be used in process systems engineering applications. Particular focus is given on integrating planning and scheduling layers in multi-scale, multi-period, stochastic problems.

Jay H. Lee obtained his B.S. degree in Chemical Engineering from the University of Washington, Seattle, in 1986, and his Ph.D. degree in Chemical Engineering from California Institute of Technology, Pasadena, in 1991. From 1991 to 1998, he was with the Department of Chemical Engineering at Auburn University, AL, as an Assistant Professor and an Associate Professor. From 1998-2000, he was with School of Chemical Engineering at Purdue University, West Lafayette, and then with the School of Chemical Engineering at Georgia Institute of Technology, Atlanta from 2000-2010. Since 2010, he is with the Chemical and Biomolecular Engineering Department at Korea Advanced Institute of Science and Technology (KAIST), where he was the department head from 2010-2015. He is currently a Professor, Associate Vice President of International Office, and Director of Saud Aramco-KAIST CO2 Management Center at KAIST. He has held visiting appointments at E. I. Du Pont de Numours, Wilmington, in 1994 and at Seoul National University, Seoul, Korea, in 1997. He was a recipient of the National Science Foundation's Young Investigator Award in 1993 and was elected as an IEEE Fellow and an IFAC (International Federation of Automatic Control) Fellow in 2011 and AIChE Fellow in 2013. He was also the recipient of the 2013 Computing in Chemical Engineering Award given by the AIChE's CAST Division and the 2016 Roger Sargent Lecturer at Imperial College, UK. He is currently an Editor of Computers and Chemical Engineering and also the chair of IFAC Coordinating Committee on Process and Power Systems. He published over 180 manuscripts in SCI journals with more than 13000 Google Scholar citations. His research interests are in the areas of system identification, state estimation, robust control, model predictive control, and reinforcement learning with applications to energy systems, bio-refinery, and CO2 capture/conversion systems.