Interest has increased in recent years in the design of advanced manufacturing systems, towards making major advances in product quality and productivity. Some specific advanced manufacturing systems are used to illustrate their control-relevant characteristics, which include (1) high to infinite state dimension, (2) parameter uncertainties, (3) time delays, (4) unstable zero dynamics, (5) actuator, state, and output constraints, (6) stochastic noise and disturbances, and (7) phenomena described by combinations of algebraic, ordinary differential, partial differential, and integral equations (that is, generalizations of descriptor/singular systems). Progress is discussed in the development of systems and control methods to address these challenges, which include hierarchical “plantwide” control coupled with sensitivity and probabilistic uncertainty analyses for hybrid systems; “plug-and-play” technology for accelerating the design and implementation of automation, systems, and control solutions; and advanced robust model predictive control formulations. Both experimental and realistic simulation results are presented for advanced manufacturing facilities developed, constructed, and thoroughly validated at the Massachusetts Institute of Technology.

Biography:
Richard D. Braatz is the Edwin R. Gilliland Professor at the Massachusetts Institute of Technology (MIT) where he does research in control theory and its application to advanced manufacturing systems. He received an MS and PhD from the California Institute of Technology and was the Millennium Chair and Professor at the University of Illinois at Urbana-Champaign and a Visiting Scholar at Harvard University before moving to MIT. He has consulted or collaborated with more than 25 companies including IBM, United Technologies Corporation, and Dow Chemical, and leads the automation, systems, and control activities of multiple advanced manufacturing research programs at MIT. He is the President of the American Automatic Control Council and was the Editor-in-Chief of IEEE Control Systems Magazine from 2012 to 2014. He is a recipient of the AACC Donald P. Eckman Award, the Antonio Ruberti Young Researcher Prize, the IEEE CSS Transition to Practice Award, and the ISA Excellence in Technical Innovation Award. He is a Fellow of the Institute of Electrical and Electronics Engineers and the International Federation of Automatic Control, and a member of the U.S. National Academy of Engineering.

Date: 30 July 2019 (Tuesday)
Time: 1400
Venue: Room 2503 (Lifts 27-28)