

COLLEGE OF ENGINEERING

Control Seminar



Honoring Elmer Gilbert (1930-2019) and his contributions to Control Systems

Why Control Technology Is Powerful, Dangerous, and Arguably Anti-Scientific



DENNIS BERNSTEIN

Professor

University of Michigan

Department of Aerospace Engineering

Friday, November 22, 2019

3:30 – 4:30 pm 1500 EECS

ABSTRACT: Successful control technology, such as quadcopters and walking robots, gives the impression that the field is mature. In the motivational part of the talk, I will show that these applications possess features that make them “easy” to control, while numerous potential applications remain outside our reach. To explain why, I will first demonstrate that feedback control is a powerful—almost miraculous—technology, and then deliver the bad news that the same technology can be extremely dangerous. In the technical part of the talk, I will describe recent advances in adaptive control aimed at challenges that make many problems—such as scramjet engines and the power grid—hard. Finally, in the provocative part of the talk, I will argue that feedback control is anti-scientific since its ultimate goal is to manipulate the world without fully modeling it.

BIO: Professor Bernstein’s interests include identification, estimation, and control for aerospace applications. His research has focused on active noise and vibration control, adaptive flight control, and attitude control for space applications. His current interests are in the theory and application of nonlinear system identification, large-scale state estimation for data assimilation, and adaptive control. He was Editor-in-Chief of the *IEEE Control Systems Magazine* from 2003 to 2011. He has coauthored more than 200 journal papers and 400 conference papers, and he is the author of *Scalar, Vector, and Matrix Mathematics*, third edition published in 2018.