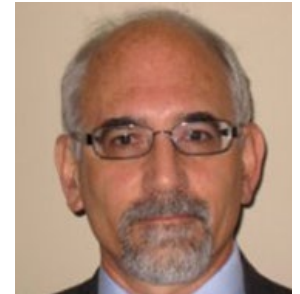


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May 2nd, 2024

12:30 – 1:00 PM Coffee/Pastry Mixer

1:00 – 1:50 PM, Foege N130

live stream: <https://washington.zoom.us/j/92391823761>

“Control Engineering of Biological Systems”

ABSTRACT: In 1788, James Watt invented the flyball governor, a feedback system that regulated the speed of steam engines. Since then, the advantages of designing systems with feedback control have motivated the development of control engineering, a discipline that blends mathematical theory with practical experience. Today, mechanical, electrical, computer, and many other engineering fields use control engineering to develop systems that do regulation, tracking, and noise rejection, and are stable, have short settling times, and avoid oscillations.

This talk addresses the application of control engineering to biological systems. Biological systems make extensive use of both positive and negative feedback, and control engineering has been used to understand these mechanisms. In addition, designing systems with biological components often requires adding feedback, such as for the design of biostats and chemostats, automated drug delivery (e.g., via a skin patch), and robotic assistance. This talk introduces core concepts of control engineering, discusses a workflow for control analysis and design, and overviews current research in control engineering of biological systems. The talk concludes with pointers to resources where you can learn more about control engineering, including courses in the UW Bioengineering Department.

BIO: Dr. Joseph L Hellerstein earned a PhD in Computer Science from the University of California in Los Angeles, CA. He was Senior Manager of the Adaptive Systems Department at IBM’s Thomas J. Watson Research Center in New York where he led the creation of control systems for several IBM products. Subsequently, he was a Principal Engineer at Microsoft, developing control technologies for multicore resource management; and he managed software teams at Google related to the Google compute infrastructure. Since 2014, Dr. Hellerstein has been at the University of Washington developing software and analysis techniques for building mechanistic models of biological systems. He teaches Advanced Biological Control Systems (BIOEN 498/599), and co-teaches Computational Systems Biology (BIOEN 437/537) with Dr. Herbert Sauro. Dr. Hellerstein has over 150 peer reviewed publications, 30 patents, and is a fellow of the IEEE for contributions to the control engineering of the performance of computing systems.