AIChE Webinar Series

Computing & Systems Technology Division (CAST) Welcomes

Dr. Ali Cinar

Professor of Chemical Engineering
Director, Engineering Center for Diabetes Research and Education (ECDRE)
Illinois Institute of Technology

ILLINOIS INSTITUTE OF TECHNOLOGY

Control of Artificial Pancreas Systems

Artificial pancreas (AP) holds promise for improving blood glucose homeostasis in patients with Type 1 diabetes (T1D). Several control techniques have been proposed for developing the control algorithms of an AP. The presentation will introduce various control techniques (PID, model predictive control, adaptive control, fuzzy logic) used in AP systems. Research efforts have focused on various control algorithms and estimation techniques for the carbohydrate content and timing of meals. Physical activity has a significant effect on glucose utilization and blood glucose concentrations (GC), and can cause hypoglycemia during or after exercise, with a high likelihood of promoting nocturnal hypoglycemia. A multivariable AP control algorithm that can accommodate the effects of exercise will be presented. It uses physiological data from sports armbands that are incorporated in models to improve the accuracy of glucose concentration predictions and in the control logic of the control system. Hypoglycemia is a major challenge for AP systems. Since patients with T1D do not have natural means to reduce plasma insulin levels and their glucagon response is often impaired, they are unable to prevent hypoglycemia with endogenous means. AP systems with dual hormones (insulin and glucagon) and an integrated multivariable hypoglycemia early alarm and control system for glucose regulation in patients with T1D will be discussed.

Biography:

Ali Cinar is a professor of chemical engineering at Illinois Institute of Technology and the director of the Engineering Center for Diabetes Research and Education (ECDRE). He has a joint appointment in the Biomedical Engineering Department at IIT. He was Vice Provost for Research and Dean of the Graduate College at IIT from 2000 to 2013. His research specializations include diabetes and control of artificial pancreas systems; modeling of angiogenesis and tissue growth; modeling, supervision, and control with agent-based systems; and multivariate statistics and artificial intelligence techniques. Dr. Cinar holds a Ph.D. in chemical engineering from Texas A&M University. He is a Fellow of AIChE and member of ADA, BMES, IEEE, and TERMIS. He has published two books, over 180 technical papers in refereed journals and conference proceedings. Full list of publications, detailed description of research interests, presentations, and software is available at **http://mypages.iit.edu/~cinar**

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