SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

Zaborszky Distinguished Lecture Series 2010

Model-based Control Design of an Artificial Pancreas for Subjects with Type 1 Diabetes

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Wednesday, September 15, 2010
9:30 – 11:00 a.m.
Stephen F. & Camilla T. Brauer Hall, Room 12

http://ese.wustl.edu/zaborszky

Abstract: One of the great challenges in the design of any feedback control algorithm is the striking of a compromise between performance (often characterized by the speed of recovery from disturbances) and robustness to uncertainty. This is the case for the design of algorithms to control the artificial pancreas. On one hand, it is desired to have a fast algorithm that minimizes postprandial (post-meal) glucose excursions and returns to normal glycemia as quickly as possible. On the other hand, excessive use of insulin coupled with uncertain patient characteristics (e.g., insulin sensitivity, correction factor, etc.) can lead to dangerous swings in glucose levels. This is exacerbated by the intrinsic limitations imposed by current technology for actuation (pumps) and sensing (continuous glucose monitors) with subcutaneous transport lags.

In this talk, a methodology will be outlined that allows one to maximize the robust performance of a closed-loop artificial pancreas. The algorithm is comprised of a zone model predictive controller combined with safety features that account for insulin on board in order to minimize overdosing of insulin. Various metrics are employed to evaluate the performance of the algorithm and recent clinical prototyping of the artificial pancreas will be described.

Host: Dr. Hiro Mukai

Washington University in St. Louis
School of Engineering & Applied Science