



The Department of Mechanical Engineering presents:

The Master's Thesis Defense of

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**Monday, June 3, 2019,
3:00 PM, Winston Chung Hall 203**

Master of Science, Graduate Program in Mechanical Engineering
University of California, Riverside, June 2019
Dr. Thomas Stahovich, Chairperson

Title: Simultaneous State and Parameter Estimation of Glucose Metabolism in Type 1 Diabetes subjects

Abstract: Approximately 1.5 million people live with type 1 diabetes in the US alone. The chronic disease must be managed by adopting a strict glycemic control regimen. We have developed a prediction algorithm to aid in bolus calculation and meal planning. By continuously estimating the parameters of a physiological metabolism model, the algorithm can predict blood glucose concentrations 30-minutes in advance. Such a prediction system allows a subject to prevent hypoglycemic episodes. The algorithm uses continuous glucose monitor (CGM) measurements along with meal and insulin inputs to compute the best fit on a patient-specific model. The prediction accuracy is evaluated by computing the root mean squared error (RMSE) between predicted 30-minute concentration and the actual value. An average RMSE value of 18 mg/dl is achieved on the datasets. The algorithm also predicts over 83% of the values within zone A of the Clarke error grid. Further, the system is implemented on a web server that interfaces with Dexcom's share-API. The web service makes prediction data available to care-providers in real time for timely intervention in hypoglycemia events.