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Artificial Pancreas Researchers Win Wyss IEEE Translational Research Award

Sansum Diabetes Research Institute is pleased to announce that researchers from Sansum and the University of California, Santa Barbara (UCSB) were among three awardees out of 128 entrants in the 2nd Annual Wyss Institute IEEE EMBS Award for Translational Research, which recognizes projects with potential to make ?transformative impact on healthcare safety, quality, effectiveness, accessibility and affordability.?

The Sansum/UCSB submission, ?Clinical Translation of MPC for the Artificial Pancreas,? describes the researchers? ongoing work on a system for automatically controlling blood glucose in people with type 1 diabetes ? a collaboration that began in 2006. Presenting on behalf of the Sansum medical team and UCSB Chemical Engineering Department were Professor Frank Doyle, Dr. Eyal Dassau, and Dr. Howard Zisser.

?This is wonderful recognition for the artificial pancreas work at UCSB and Sansum,? said Doyle, Mellichamp Professor of Process Control in the UCSB Chemical Engineering Department. ?We are well known in the diabetes community, but to be recognized across all of translational biomedical engineering is a tremendous honor.?

?This award was a confirmation that a close relationship between engineering and medicine is the right path forward,? said Dassau, Senior Investigator & Diabetes Team Research Manager at UCSB. ?I think that the Wyss Institute?s vision for biologically inspired, interdisciplinary research is exactly what UCSB and Sansum have been doing for the past six years.?

The ultimate goal of artificial pancreas research is to develop products that make living with diabetes safer and easier, explained Zisser, Director of Clinical Research & Technology at Sansum and Adjunct Professor of Engineering at UCSB. Current artificial pancreas prototypes consist of an insulin pump and a continuous glucose monitor (CGM) that are both controlled by software run on a third device, such as a laptop computer, tablet, or mobile phone.

The prototypes are studied in overnight ?closed-loop? trials that depend on volunteer ?subjects? with type 1 diabetes, who get to take a break from diabetes self-management but must have their blood drawn frequently as part of the experimental protocol. In supervising the trials, Zisser works closely with both participants ? some of whom have been volunteering to test new diabetes technologies for over five years ? as well as the companies that donate insulin pumps, CGMs, and other supplies. ?None of this would be possible without our dedicated subjects and industry partners,? he said.

The success of any artificial pancreas system relies on the software program, or algorithm, that analyzes glucose data from the CGM and tells the pump how much insulin to deliver. The Sansum/UCSB team uses a kind of algorithm called model predictive control (MPC), which is traditionally used in oil refineries and chemical plants. Using MPC for glucose control was first proposed in the mid-1990s by a research team including Dr. Doyle, who maintained his interest in the field when he arrived at UCSB in 2002. ?The power of our approach is to use a very flexible yet sophisticated control platform (model predictive control) and to tailor it

to the medical needs and safety considerations of the artificial pancreas,? Doyle said.

The Sansum/UCSB team presented their work along with five other finalists at the 2012 Conference of the Institute of Electrical and Electronics Engineers (IEEE) Engineering in Medicine & Biology Society (EMBS) in San Diego, CA on August 29, 2012.

?It?s nice to receive some appreciation of our contribution to the development of an artificial pancreas and othe r devices that will help with the daily lives of people with type 1 diabetes,? said Dassau. But, he added, ?The best acknowledgement is to hear from subjects in trials that they?ve had a vacation ? a day not having to worry abou t their diabetes.?

Images

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