

Wearable Technology and Machine Learning for Sustainable Dairy Farming

Bio

Younghyun Kim is an Associate Professor in the Elmore Family School of Electrical and Computer Engineering at Purdue University. Before joining Purdue in 2024, he was with the University of Wisconsin-Madison from 2016 to 2023. He was a Postdoctoral Research Assistant at Purdue University from 2013 to 2016. He received his Ph.D. degree in Electrical Engineering and Computer Science in 2013 and B.S. degree (highest honor) in Computer Science and Engineering in 2007, both from Seoul National University. His Ph.D. dissertation won the EDAA Outstanding Dissertation Award (2013). He is a recipient of the NSF CAREER Award (2019), Meta Research Faculty Research Award (2021), and other awards for designs and demonstrations. His research interests include security and privacy for embedded computing systems, energy-quality scalable computing, machine learning at the edge, and cyber-physical systems.



Abstract

Heat stress, a consequence of climate warming and the heightened milk production demands on dairy cattle, poses a significant threat to the welfare of the animals and the overall sustainability—economic, environmental, and social—of dairy farming worldwide. Identifying cows experiencing heat stress promptly is essential for enhancing animal welfare, minimizing milk production losses, and conserving water and energy resources required for cooling. This talk introduces our multidisciplinary research on precision dairy farming using wearable technology and machine learning. I will introduce our novel system for detecting heat stress in a timely manner and machine learning approaches on multi-modal sensing. I will talk about our multi-phase development and evaluation of the proposed system and present how we collaborate with animal scientists and biosystems engineers for closed-loop control of the barn.

