Title: Optimization of wearable sensor design

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Abstract:

Wearable sensors are being widely used for health monitoring. These wireless sensors are envisioned to operate on scarce harvested energy resources. In addition to the hardware and software constraints arising from the form-factor and low energy operations, there are safety requirements to avoid any physical injury. The design implications of these requirements are non-intuitive and may involve the estimation of human physiological dynamics. The physical impact of a sensor operation can be controlled by the appropriate design of multiple sensor components e.g. the processor, radio, and optimization of the data algorithm. For example, the risk of thermal injury to tissue can be reduced by limiting the sensing frequency, the computation power, and the radio duty cycle of the body-worn sensor. Hence, it is a challenging task to trace back a cause of a physical impact on hardware and software design decisions in a sensor. This talk will focus on a non-linear optimization framework to generate sustainable and safe sensor configuration while considering interactions of the wearable sensors with the environment. It uses a hybrid simulator to simulate the continuous dynamics of the physical system. This methodology is demonstrated using three case studies: a) continuously monitoring ECG sensor sustained by body heat, b) thermally safe network of implanted sensors, and c) infusion pump control algorithm to avoid hypoglycemia.

Bio:

Dr. Priyanka Bagade has obtained her Ph.D. in Computer Science and Engineering in Dec 2015 from Arizona State University. Her research was focused on the safety, security, and sustainability of IoT systems for healthcare using mathematical modeling and simulations. Currently, she is working at Intel Corporation as an IoT software engineer. Her current research at Intel involves product innovation through the integration of deep learning and computer vision on Intel IoT platforms. She also architects IoT solutions for Intel customers and develops products to help customers enable their solutions on deep learning.