CARNEGIE MELLON UNIVERSITY
BME 2023 SPRING SEMINAR SERIES

Digital Medicine for Cardiovascular Health

PRESENTED BY

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SCHEDULE

Hall of Arts (HOA) 160

**Thursday,
March 2, 2023**
(11:00AM-12:00PM)

The bold vision of pervasive physiological monitoring, through proliferation of off-the-shelf wearables that began a decade ago, has created immense opportunities for precision medicine outside clinics and in ambulatory settings. Although significant progress has been made, several unmet needs remain; Limited availability of advanced wearable sensing paradigms, noise and missingness in wearable data and labels in ambulatory settings, the unknown circumstances surrounding data capture in wearable paradigms, heterogeneity of the users both in terms of physiological and behavioral states, and often limited view into the user's physiological state prevent extraction of actionable information.

This seminar presents several topics that coherently articulate on the vision and the opportunities of digital medicine for cardiovascular health. The seminar covers three pillars of digital medicine, i) sensing, ii) signal processing and iii) context aware analytics and personalization as it pertains to cardiovascular health. We will introduce several novel sensing paradigms using bio-impedance that leverage various types of electrodes and electronic tattoos enabling blood pressure measurement with clinical grade accuracy. We will discuss the notion of particle filters that provide a generalizable and robust paradigm for reducing the impact of noise. Finally, we will discuss the notion of digital twin leveraging machine learning/AI, that will enhance the ability to extract actionable information in the context of several real-world applications.

Digital medicine and wearables will play a significant role in the future of medicine outside clinics. The future directions present opportunities both in short-term translational research efforts with direct influence on clinical practice as well as long-term foundational development of theories and computational frameworks combining human physiology, physics, computer science, engineering, and medicine, all aimed at impacting the health and wellbeing of our communities.

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