CARNEGIE MELLON UNIVERSITY
BME 2023 SPRING SEMINAR SERIES

Personalized Healthcare Decision-Making Using Digital Twins and Machine Learning

PRESENTED BY

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SCHEDULE

Hall of Arts (HOA) 160

**Tuesday,
March 14, 2023**
(11:00AM-12:00PM)

This talk describes the translation of different computational models into clinical applications for individualized and proactive assessment of disease diagnosis, treatment planning, and medical devices design. First, digital twins modeling of the cardiovascular system for rapid medical decision-making will be discussed. This work centers on the development of an accurate physics-based reduced-order modeling framework to accelerate blood flow simulations. The ability of this framework in accurate diagnosis and personalized treatment planning will be presented in a broad variety of cardiovascular disease applications. The second part of this talk will focus on a new learning-based computational modeling paradigm to design mechanical structures. Here, a machine learning framework with end-to-end differentiability integrated with continuum mechanics modeling will be introduced. Next, the talk will focus on the utility of this tool to design novel compliant structures with desired functionality for applications from soft robotics to biomedical devices. The talk will conclude with a vision for how these diverse computational approaches can be combined to facilitate precision healthcare and health planning.

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