PennState Center for Neural Engineering

CNE Seminars

Wednesday, December 1, 2021
12:00 – 1:00 pm/Zoom

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Tackling Brain Diseases with Mechanics and Advanced Neuroimaging

ABSTRACT

The human brain is the continuous subject of extensive investigation aimed at understanding its behavior and function. Despite an overwhelming interest and major research initiatives on how our brain operates, comparatively little is known about how it functions at the mechanical level. Recent findings have directly linked major brain development, mechanisms, and diseases to the mechanical response of the brain both at the cellular and tissue levels. Despite clear evidence that mechanical factors play an important role in regulating brain activity, current research efforts focus mainly on the biochemical or electrophysiological activity of the brain, mostly due to the difficulty of probing the brain physically.

In this talk, I will present how a combination of novel computational and imaging methods can provide insights into the world of brain biomechanics. I will introduce novel neuroimaging tools that can measure and track how the brain moves inside the skull, even during physiological processes. Combined with computational modeling and advanced system identification tools, these tools provide important understanding into the spatiotemporal mechanics of the human brain. I will demonstrate how studying the motion of the brain *in vivo* opens up a number of important clinical applications; enabling earlier diagnosis and intervention of brain pathologies such as traumatic brain injury, hydrocephalus, Chiari Malformation, Alzheimer's disease, and other degenerative diseases.

BIO:

Prof. Mehmet Kurt is the director of Kurtlab (www.kurtlab.com) and an Assistant Professor at the Department of Mechanical Engineering at Stevens Institute of Technology since January 2017. He also holds an adjunct faculty position at the Biomedical Engineering and Imaging Institute (BMEII) at Icahn School of Medicine at Mount Sinai. His primary research area of interest is brain biomechanics and neuromechanics imaging. He received his Ph.D. in Mechanical Science and Engineering from the University of Illinois at Urbana-Champaign in 2014 on developing novel nonlinear system identification methods. He was a postdoctoral scholar in the Departments of Bioengineering and Radiology at Stanford University from 2014-2017. His awards include Provost's Early Career Award for Research Excellence (2020), NSF Vizzies Best Scientific Visualization Award, People's Choice (2018), Annals of Biomedical Engineering "Editor's Choice Award" (2017), Thrasher Research Foundation Early Career Award (2015), and the Thomas Bernard Hall Prize for the Best Paper of the Year (2011). His research has been highlighted in various media outlets such as Reuters, Newsweek, CBS News and Washington Post. His research group is currently sponsored by multiple grants from NSF, NIH and DoD.