Yale Center for

Biomedical Data Science

**CBDS Digital Health Series**

**“Cuffless Blood Pressure Monitoring:
Challenges and Opportunities”**

Wednesday, September 18, 2019
4 p.m. to 5 p.m. Seminar

TAC N203 ~ 300 Cedar Street

Continuous and robust monitoring of physiological signals with wearable devices provides new opportunities for improving the care and outcomes for people with or at risk of a broad range of adverse health events. One challenge has been that many devices are obtrusive, cumbersome, not very convenient to wear, and unsuitable for ambulatory care. Limited reliability and robustness of these sensing paradigms have also been among contributing factors that prohibit the adoption of wearable devices into the FDA-regulatory space and medical applications. Another challenge to the current method of measuring certain hemodynamic parameters such as blood pressure (BP), is that cuff-based sensors are only capable of providing infrequent measurements and are uncomfortable. Elevated BP is a critically important risk factor for various cardiovascular disorders (i.e., heart attack, stroke, heart failure), kidney diseases, vision loss, and sexual dysfunction. In this talk, we highlight our techniques that directly address these unmet needs for a device that can unobtrusively, accurately, and continuously measure BP. We seek to develop and test a novel transformative solution which addresses concerns of wearability and robust sensing, and enables new sensing paradigms that can be deployed for field-based, mobile, or ambulatory care. We will discuss a number of sensing and signal processing paradigms that capture physiological observations including bio-impedance. Our primary focus remains capturing signals including blood pressure, heart rate, heart rate variability and respiration rate from a wrist-worn device with a watch form factor with high degrees of precision. We will discuss several methodologies for noise rejection that improve the robustness of signal acquisition. We will also discuss AI and deep learning that augment the capabilities of wearables through context construction. We will offer concluding remarks on the trends of wearable computing technology development and potential future directions. This talk discusses research in collaboration with Drs. Krumholz, Spatz and Mortazavi.

Roozbeh Jafari (<http://jafari.tamu.edu>) is an associate professor in Biomedical Engineering, Computer Science and Engineering and Electrical and Computer Engineering at Texas A&M University. He received his PhD in Computer Science from UCLA and completed a postdoctoral fellowship at UC-Berkeley. His research interest lies in the area of wearable computer design and signal processing. His research has been funded by the NSF, NIH, DoD (TATRC), AFRL, AFOSR, DARPA, SRC and industry (Texas Instruments, Tektronix, Samsung & Telecom Italia). He has published over 150 papers in refereed journals and conferences. He has served as the general chair and technical program committee chair for several flagship conferences in the area of Wearable Computers including. He is the recipient of the NSF CAREER award in 2012, IEEE Real-Time & Embedded Technology & Applications Symposium (RTAS) best paper award in 2011 and Andrew P. Sage best transactions paper award from IEEE Systems, Man and Cybernetics Society in 2014. He is an associate editor for the IEEE Transactions on Biomedical Circuits and Systems, IEEE Sensors Journal, IEEE Internet of Things Journal and IEEE Journal of Biomedical and Health Informatics. He serves on scientific panels for funding agencies frequently and is presently serving as a standing member of the NIH Biomedical Computing and Health Informatics study section.