Electrical & Computer Engineering

S E M I N A R

Louisiana State University

Wearable Bio-Sensors: Key to the Future of Digital Healthcare

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Abstract—Wearable biosensor technology is one of the enabling technologies for digital/connected healthcare as it can enhance the efficiency and convenience of patient monitoring in many ways. This talk introduces the recent achievements in wearable biosensors for unobtrusive long-term health monitoring systems. Firstly, the speaker will discuss a novel approach for continuous cuffless blood pressure sensing technology. The novel sensor measures the speed of blood flow; then extracts the blood pressure from the flow speed using short range Doppler radar technology in concert with a machine learning algorithm. The prototype system was designed with a custom-built electronics and a 4-compartment phantom mimicking the human wrist. Preliminary experimental results show the measured speed of fluid flow ranging from 5 to 60 cm/s. Secondly, the speaker will introduce a multimodal analog front-end (AFE) IC that enables integration of multiple bio-sensors in wearable and attachable sensor systems. The AFE IC supports the most frequently used bio-sensors such as electrocardiogram (ECG), photoplethysmogram (PPG), and bio-impedance with a power consumption of less than 2 mW for all aforementioned sensing modalities. Lastly, the speaker will share ideas for future directions of bio-sensors in the digital healthcare domain.

Bio—Dr. Insoo Kim received his B.S. and the M.S. degrees in electrical engineering from Korea University, Seoul, Korea, and the Ph.D. degree in electrical engineering from The Pennsylvania State University, University Park, PA. He was with The Center for Neural Engineering at the Pennsylvania State University as a post-doctoral research associate from 2009 to 2012. He is currently Lead Research Engineer at Samsung Research America, Richardson, Texas, where he led various research projects encompassing the development and validation of mobile healthcare sensor technologies, brain computer interface, and medical imaging methods. He is passionate about developing innovative technologies to sense/process physiological signals for therapeutic/assistive and chronic disease management devices. He is a co-author of more than 40 peer-reviewed technical papers and (co-)inventor of 6 U.S. patent applications in the areas of VLSI circuits and systems, biomedical imaging systems, and wearable sensors. He is a member of the Technical Committee on Wearable Biomedical Sensors and Systems (WBSS) of the IEEE Engineering in Medicine and Biology Society (EMBS).

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