SMU Department of Mechanical Engineering
SEMINAR

"Sleep Disordered Breathing Detection Using Spectrogram of Features Derived From Nocturnal Electrocardiogram"

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Friday, March 25, 2011
3:00 p.m. – 4:00 p.m.
Junkins 110

Abstract: It is estimated that approximately 6% of US adult population suffer from sleep disordered breathing (SDB). SDB increases the mortality risk by adversely affecting the cardiovascular health. The incidence of SDB is expected to rise due to increase in population age and obesity. It is widely believed that many patients suffering from SDB go undiagnosed. In part, this is due to high cost of diagnosis which involves nocturnal polysomnography study in an accredited sleep laboratory (approximately $1500-$2000 per study). Additionally, accredited sleep laboratories are not available in all areas of the country. Researchers have shown that it is possible to use electrocardiography (ECG) to detect obstructive sleep disordered breathing. However, it is important to have a robust method that can detect the occurrence of SDB with high degree of specificity and sensitivity. There are significant advantages associated with detecting SDB using ECG, including low cost, possibility of evaluating the patient at his/her home, and obtaining concurrent cardiac information from the ECG recording. In the first half of this presentation, a new method of using spectrogram of features extracted from the ECG signal is introduced. The principles of the classification in the method are presented. The performance of the proposed method in detecting apneas in a sample population of control subjects and confirmed sleep apnea patients is presented. In the second half of the presentation, highlight of current research activities by faculty members in the Department of Bioengineering at the University of Texas at Arlington is presented.

Bio: Dr. Khosrow Behbehani is the Chair of Bioengineering Department at UT Arlington. Dr. Behbehani's research focus is on development of effective diagnostic and therapy methods for obstructive sleep apnea. Together with his students and collaborators he has secured 7 U.S. patents on innovations in this area. The technology covered by the patents has been commercialized by Respironics which is the largest manufacture of Sleep Apnea Therapy devices in the U.S. It is estimated that so far more than half a million sleep apnea patients have been treated with the device.

Prior to joining UT Arlington, Dr. Behbehani was a Senior Staff Engineer with Puritan Bennett, the largest U.S. manufacturer of critical care ventilator. In that capacity, he designed and implemented the first FDA-approved microprocessor-based control system for a critical care ventilator (PB 7200). The state-of-the-art ventilator has been placed in several hundred thousand health care facilities around the world treating patients with lung and respiratory illness or injury.

Dr. Behbehani holds a B.S. in Mechanical Engineering from Louisiana State University and M.S. in Industrial and System Engineering from Georgia Institute of Technology and Ph.D. in Engineering Science from University of Toledo. During his Ph.D. studies he was a resident Ph.D. candidate with NASA Lewis (now John Glen) Research Center in Cleveland Ohio. Dr. Behbehani has authored or co-authored more than 100 publications, including a chapter on patient lung ventilation in the Biomedical Engineering Handbook, now in its third edition.

Dr. Behbehani is a Fellow of American Institute for Medical and Biological Engineering. He is also is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), a Life Member of the honor society Phi Kappa Phi, a member of American Society of Mechanical Engineers, American Society of Engineering Education, and Sigma Xi. He is an Associate Editor for the IEEE Transactions on Engineering in Medicine and Biology.