EKG Signals to Detect Sleep Apnea
### UTA (06-28)

Technology Need:

An estimated 22 million Americans suffer from sleep apnea. This number is only estimated because 80% of the cases of sleep apnea go undiagnosed. The reason for this lacking statistic is two-fold. First, standard methods for detecting and quantifying sleep disorders are based on respiration monitoring. This method is expensive and disturbs normal sleep patterns, therefore decreasing the effectiveness of the test. Second, often this diagnostic is administered by a specialist. This increases the difficulty of receiving care from a more sparse population of healthcare providers. When sleep apnea is untreated it leads to high blood pressure and chronic heart failure among other problems.

Solution/ Offering:

Researchers here at UTA have developed a method of using heart rate variability (HRV) to detect sleep apnea. An electrocardiogram (EKG) is recorded and converted into a HRV signal. The HRV signals are then studied quantitatively to detect apneic episodes. The entire process employs signal processing techniques in combination with a Fuzzy Logic system to complete its analysis. Since EKGs are not as intrusive or expensive as respiration monitoring equipment, this method of detecting sleep apnea can be more broadly adopted by healthcare providers.
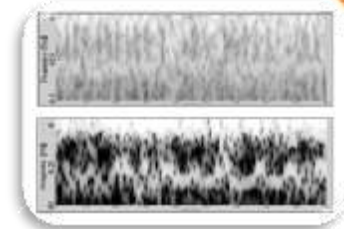
Value Proposition:

✓ Quantitative observation of Heart Rate Variability time-frequency plots to detect sleep apnea
✓ Cheaper implementation of sleep apnea diagnostics
✓ Less intrusive diagnostic method and allows for infant sleep apnea monitoring

Industrial application:

✓ Healthcare

Patent Status:

✓ Granted:
   US 7966061 B2

Publication:

✓ A New Method to Detect Obstructive Sleep Apnea Using Fuzzy Classification of Time-Frequency Plots of the Heart Rate Variability

Meet the Inventor

Dr. Khosrow Behbehani, now the dean of the College of Engineering at UTA, received his Ph.D. from the University of Toledo in 1979. His main research focus has been in developing medical devices for pulmonary healthcare. He has been a professor at the university since 1998 and is a Fellow of the American Institute for Medical and Biological Engineering and the IEEE.

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