A Real-time Wearable Device for the Prediction and Noninvasive Therapy of Obstructive Sleep Apnea

Published date: Nov. 2, 2018

Technology description

Overview

Obstructive sleep apnea (OSA) is a medical condition which impedes the airflow through the pharyngeal airways resulting in interrupted breathing during sleep. Sleep apnea occurs due to a collapse of the tissue walls around upper airways that causes irregular shallow breathing (hypopnea) or discontinued breathing (apnea). OSA is the most common type of sleep apnea that affects over 18 million Americans with 2-4% of those going undiagnosed. 25% of middle-aged men and 9% of middle-aged women suffer from OSA. Undiagnosed or untreated OSA can cause headaches, short-term memory, stroke, insomnia, daytime fatigue, cognitive problems and could be fatal for those with cardiovascular disorders. Although there are some surgical and non-surgical treatments for OSA, there is a need for a state-of-the-art solution which can forestall the occurrence of the apnea episodes.

Technology

The proposed solution is a light-weight device that gathers data from the patient’ s neck, predicts the occurrence of an apnea episode and makes a therapeutic intervention so the apnea event is preempted from happening. The device uses a multichannel photoplethysmography (PPG) sensor with photodiodes and two pairs of red and infrared light emitting diodes. From the PPG’ s waveform three different biomarkers are identified (heart rate, respiration rate and oxygen saturation level) so the prediction can be made with a robust set of body signals. The prediction algorithm uses reliable machine learning techniques to estimate the likelihood of an apnea episode occurrence so the therapeutic intervention.

Research Interests

Self-sustainable sensor networks

Nonlinear continuous flow modeling

RF sensor application for container integrity monitoring

Heterogeneous wireless sensor based modeling

Application area

Obstructive sleep apnea (OSA) treatment
Other sleeping disorders

Advantages

Combined prognostic and therapeutic system at low price
Minimized configuration with just one sensor
Customizable and ergonomic pillow based sensing system

Institution

Texas A&M University

Inventors

Satish T.S. Bukkapatnam

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com