HDYS (How Did You Sleep): A Home-Based System for Monitoring and Treating Insomnia

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Our goal is to help more than 30% of the world's population to sleep better by providing a non-invasive closed loop system for improving sleep that can be used at home. The system is built into a headband that the patient wears while going to sleep. The system measures brain wave activity using EEG electrodes, eye movement using EOG electrodes, and oxygen saturation using a pulse-oximeter. The system collects and analyzes data from the sensors to identify if patient needs assistance falling asleep. The treatment includes reducing the error; or the delta between the wanted stage and the current stage of brain activity. Based on previous research, the system reduces the delta by playing a different frequency to each ear; the brain subtracts between the two and synchronizes according to the difference between them. Sleep labs collect more information than the HDYS system, but the sleep lab is an unfamiliar environment which may impact the patients' sleep. Moreover, the additional equipment required is cumbersome and limits patient mobility. There are also many solutions for sleep monitoring at home but none provide information on the brain activity thus reducing the efficiency and quality of the test. The most common treatments for insomnia today include sleeping pills which are known to be addictive. Our system can help in treatment of Insomnia, providing an alternative to medication. Our system provides patients a simple, easy to use, comfortable, and cheaper alternative to a sleep lab in the comfort of a person's home coupled with non-invasive treatment for Insomnia, it's a win-win.

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