

Smart alarm clock for mobile phones

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Sleep disorders are very common in modern society. Mild forms are familiar to everyone and up to 10 – 20 per cent of adults suffer from related diseases (organic sleep disorders). Diagnosing sleep disorders often requires extensive and expensive sleep recording at a sleep laboratory. At the moment, there are hardly any good screening methods for detecting sleep disorders.

Research conducted in two Finnish universities, Tampere University of Technology and the University of Helsinki, resulted in the development of a brand-new technology for screening and even diagnosing sleep disorders. The first application of the new technology, a smart alarm clock for mobile phones, HappyWakeUp®, is now available. It is the first health-promoting mobile phone application in the world.

In Tampere University of Technology MSc Väinö Virtanen started to record and analyse snoring two years ago to develop a simple screening method. "Very soon we noticed that a common microphone is very sensitive to any sounds and voices produced by movements in the bed during night-time. Everyone has heard the typical voices, when a mobile phone has accidentally called you from someone's pocket", says sleep specialist Tapani Salmi, MD, PhD.

Could every morning be equally pleasant?

Based on the new technology, the sleep research group developed the smart alarm clock for mobile phones called HappyWakeUp. The smart alarm clock gives an alarm signal in the morning just before the ultimate

alarm time, if the sleeping subject is awake or "almost awake" due to the natural sleep rhythms. During these moments, the body and brain are already awake and waking up is natural and easy "It is rather an arousal clock than an alarm clock", says Salmi.

The alarm time is set normally with the mobile phone. The mobile phone is located beneath the pillow or the bed linen or near the sleeping subject. The appropriate almost-awake moments are detected by using a microphone and statistical analysis of voices. During the last 20 minutes before the ultimate alarm time, the analysis is activated to give a soft alarm signal, if there are movements indicating that the sleeping subject is awake or "almost awake". If the subject is sleeping calmly, no alarm signal is given before the ultimate alarm time.

"The alarm signal during deep sleep is stressful and familiar to everyone, but with the smart alarm clock this is avoided. After a trial period of some days or a week, you start to notice the benefits", promises Salmi. The continuous use of the clock helps the internal clock in your brain learn the proper sleep rhythms. "Pleasant mornings help avoid stress in your body and brain. Elevated stress-levels are associated with several risk factors and even diseases, such as hypertension and problems with the heart and brain. HappyWakeUp is not a medical product or treatment to any disease. "In case of sleep-associated diseases and symptoms you should contact your doctor", says Salmi.

HappyWakeUp is available for Nokia smart phones based on S60 3rd ed FP1 platform at www.happywakeup.com. A one-week trial period costs €2. A two-month trial period and a permanent license are also available.

Microphone to detect other sleep disturbances

The sensitive microphone recording could also be used in monitoring other aspects of sleep. The detection of restless sleep, leg movements

associated with the restless legs syndrome and screening for snoring and sleep apnea are possible by employing the same technology. The technology makes it possible to perform several repeated all-night recordings and to diagnose sleep disorders in countries and areas with no previous sleep recording facilities. The new technology is extremely cost-efficient, compared to the use of existing special medical recording devices.

The company Smart Valley Software Ltd. is developing the technology into a commercial product, supported by the Finnish Invention Foundation and the Finnish Funding Agency for Technology and Innovation (Tekes) in patent applications.

Source: Tampere University of Technology

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