

A new awakening for sleep research

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The IST project SENSATION is an ambitious project of 46 partners from 20 different countries, addressing sensing of physiological parameters, core computation, medical and industrial research. The aim is to take sleep research to a whole new level by developing a multipurpose sensing platform consisting of 17 micro sensors and two nano sensors, connected through a local area network.

"The sensors will allow you to sleep at home on, for instance, a mattress with sensors instead of going to a hospital which is much more comfortable and the test becomes more precise," explains Dr Evangelos Bekiaris, project coordinator. Today, you will have to go to a hospital sleep lab for 1-2 nights and have your sleep measured to evaluate your sleep. "These tests are costly and since monitoring sleep cannot be done in your home environment they are not as reliable," says Bekiaris.

The sensors will be integrated into a wide range of materials such as bed and pillow textiles, wrist straps, seat linings and the frames of glasses. Wirelessly integrated through a computer network they will measure your brain activity, heart rate, eye and muscle movements during your waking and sleeping hours. The data will be collected in a body area network, wirelessly transferred to a local area network and then sent to the hospital for analysis, Bekiaris explains. The sensors can also be used for safe monitoring and early warning of people while driving or supervising a critical task, like the operators of nuclear power stations or air traffic controllers, before they fall asleep and cause an accident.

The project is now halfway through its funding period and is already showing a lot of tangible results. The first stage of the project involved data collection, setting up of databases and formulating recommendations for the development of sensors.

"We have developed something which is truly unique, with two extensive databases of sleep data, one with data of normal sleep with 350 participants and another one with sleep data of 400 people monitored while working or driving, crossing the stage between vigilant to sleep," says Bekiaris. "About half of these people were tested in a driving simulator but the other half was tested driving on highways with double command cars. The tests show a significant difference in the persons reactions, as the persons in the simulator were more calm, knowing they were part of a test, whereas the people on the highways were really fighting sleep." It shows that when monitoring people in their daily lives there are significant differences in result, he continues.

The project, spanning such a vast research area, has the potential for a strong impact. According to statistics 25 per cent of the traffic accidents in the UK, or 40 per cent in the US, is related to driver fatigue. The project estimates that the SENSATION sleep platform with its sensors could reduce serious road accidents by 30 per cent and industrial

accidents by over 15 per cent.

Although one of the main areas is to develop sensors to measure the waking state of a person, both the collected data from the project and the final results can prove to be useful for further research. "Take falling asleep at workplaces as an example," he says. "Today you have techniques that might alert you as you fall asleep, but what we want is a system that will alert the person already before this happens. In some work environments or while driving it might already be too late if you have started dozing off."

The applications are vast. You could monitor aircraft pilots to make sure they are awake. It could be used to monitor babies and prevent cot death, or in sleep management, to evaluate your own sleep and from this plan shift work according to people's biorhythms, Bekiaris explains.

"We currently have nine sensors ready and plan to present the first sensors and prototypes at the International conference on 'Monitoring sleep and sleepiness - from physiology to new sensors' which will be held in Switzerland 29-30 May 2006," says Bekiaris.

Real-life tests of the prototypes and the entire sleep platform are planned to start by the beginning of next year.

Source: [IST Results](#)

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