Fraunhofer IGD

FRAUNHOFER INSTITUTE FOR COMPUTER GRAPHICS RESEARCH IGD

PRESS RELEASE

Combatting stress with a headband

New, objective measuring method for occupational health management

Fraunhofer IGD at MEDICA 2019, Düsseldorf
November 18–21

Joint Fraunhofer Stand
Hall 10, Booth G05

Stress at the workplace can produce a wide range of symptoms and has previously only been describable in subjective terms. Headache after a day at the office? Exhausted from all the noise in the shop? Stress as a possible cause is now becoming objectively measurable thanks to Fraunhofer IGD technology.

Back pain and other physical problems as the main cause on doctor's notes are a thing of the past. "Today, it's more and more often mental strain caused by stress," explained Dr. Gerald Bieber from the Fraunhofer Institute for Computer Graphics Research IGD in Rostock. "The results are high blood pressure or heart conditions, but also, most importantly, psychiatric disorders such as depression. Then workers are totally absent for weeks at a time. The impact on businesses is enormous." The solution: a system for detecting stressors in time and improving working conditions.

Until now, workplaces have been analyzed for mental stress through questionnaires and meetings. "But those are subjective assessments by an individual," said Dr. Bieber. "We need objective metrics." This is why Fraunhofer IGD is researching sensors that record the physical signs of stress, including blinking frequency, pulse and breathing rate, oxygen saturation, skin conductance and even brainwaves. The University of Rostock is integrating these sensors into a headband that can be easily worn while working. It also registers ambient parameters, such as noise level and light exposure. Stressors such as noise, drafts or light affect everyone differently. "LED lights are becoming more common and their brightness varies greatly in a very quick rhythm," explained Dr. Bieber. "We aren't consciously aware of it, but our brain still registers the stimulus. If you look at this light on a time-loop, you'll see that its intensity often drops by up to half or it even goes out altogether before going back up. That's taxing." Even fluorescent tubes have this effect.

To create a way to remedy this situation, Project SEBA was started to create a sensor-based assessment system for mental stress and strain in the workplace.

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The measuring system should be flexible, wearable without being a nuisance even during physical activity and still provide reliable data. The result is a headband packed with sensors and circuits. It is designed to be worn by workers for about four hours in order to obtain reliable data, with each person's initial state being recorded as the baseline. The entire process is controlled and visualized by smartphone, through which subjective impressions can also be entered and included in the analysis. "It's important to our research in order to continue improving the system," said Dr. Bieber.

The first field tests will begin at the end of this year at a handful of companies experiencing a high level of psychological strain due to a large number of employees being out sick. However, the meter is not intended to go to businesses themselves later on, rather to external occupational health management (OHM) consultants who are currently conducting the conventional workplace analyses. "The data from our measurements naturally will not be disclosed to employers," ensured Dr. Bieber. "The ambient data will go to consultants so changes can be made at the workplace. And only when the workers give their consent will their personal measurements be included." As a result of this analysis, certain factors can be modified depending on how a worker responds to the stressors. "It would be simple to replace a light or set up a partition to block out noise in order to relieve the strain on workers."

The University of Rostock's Project SEBA is being funded by the Federal Ministry for Economic Affairs and Energy. Fraunhofer IGD's partners on the project are Hamburg Applications, which is developing the software, Health Care 4.0 from Potsdam, which specializes in data protection and, last but not least, the University of Rostock, which is covering the psychological aspect. Previously, IGD was working mostly with pattern recognition from images. Now, as Dr. Bieber explained, the same math is being applied to recognize patterns from sensor signals.

The headband will be presented at Medica, the world's largest healthcare trade fair, which is being held in Düsseldorf in November. "There has yet to be any application like this in occupational health management," said Dr. Bieber. The mobile meter has already drawn the interest of specialists in other fields, such as doctors who want to treat phobias or sleep disorders.

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Also at Medica, Fraunhofer IGD will present its digital control station for the healthcare sector: Health@Hand is a compact information center for use in hospitals and care facilities. As a visual control station, it clearly displays all health and administrative information to staff by using a virtual representation of the real ward. Health@Hand can interact with all facility information while also meeting every security standard for this sensitive information. It significantly speeds up and facilitates necessary administrative and handover tasks within a ward, and the time saved benefits patients.

More information:
https://www.igd.fraunhofer.de/en/projects/seba-how-stressed-do-we-really-feel
https://www.igd.fraunhofer.de/en/projects/healthhand
https://www.igd.fraunhofer.de/en/institute/mission-vision/vision/individual-health

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Image 1: A headband measures the physical signs of stress and can be used in occupational health management. (© Fraunhofer IGD)

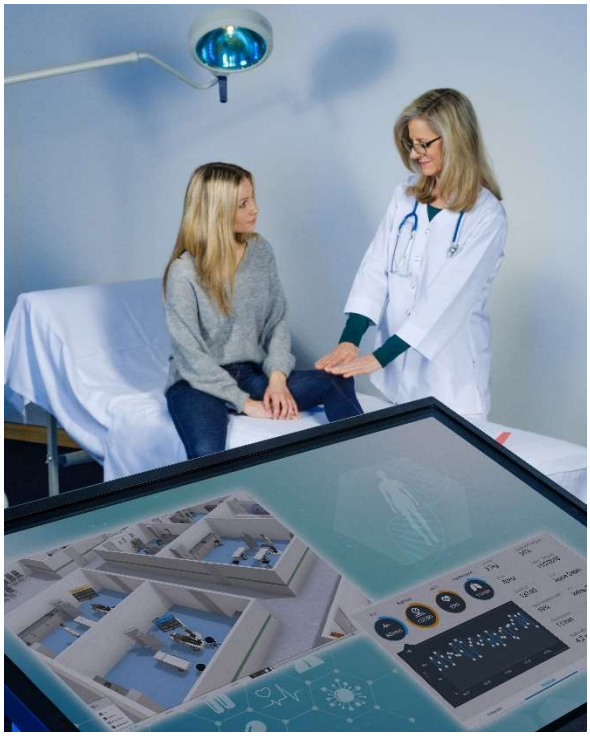

Image 2: As a virtual representation of a real ward in care facilities or hospitals Health@Hand displays all relevant data at one glance. (© Fraunhofer IGD)

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Institute profile

Founded 30 years ago, Fraunhofer IGD has become the world's leading institution for applied research in the field of visual computing. Visual computing means image and model-based IT. In simple terms, it describes the capability of transforming information into images (computer graphics) and extracting information from images (computer vision). The numerous application scenarios include human/machine interaction, interactive simulation, and modeling situations.

Our developers at the sites in Darmstadt, Rostock, Graz, and Singapore develop new technical solutions and prototypes all the way up to the market readiness stage. In collaboration with our partners, this results in application solutions that are custom-tailored to customer requirements.

Our approaches facilitate the work with computers and are efficiently used in the industry, in everyday life, and in the healthcare sector. Our research highlights includes assisting people in the Industry 4.0, the development of key technologies for the Smart City, and the use of digital solutions in the field of Individual Health.

Through applied research, we support the strategic development of the industry and economy. Especially small and medium-sized enterprises as well as service centers can benefit from this and be successful on the market with the help of our leading technologies.

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