



Measuring stress levels could be an important step to helping many types of patients | Photo source [Engin Akyurt on Unsplash](#)

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## A WEARABLE SENSOR FOR TRACKING STRESS

 HEALTH & WELLBEING

### Researchers have developed a wearable sensor that can measure stress levels without the need for a blood test

**Spotted:** Feeling stressed happens to all of us, but until now, there has been no easy way to accurately determine stress levels. That may be about to change, however, thanks to a wearable sensor developed by engineers at Switzerland's École Polytechnique Fédérale de Lausanne (EPFL). Researchers at EPFL's Nanoelectronic Devices Laboratory (Nanolab), working alongside the wearable sensor company Xsensio, have created a device that measures the concentration of cortisol — the main stress biomarker — in the wearer's sweat.

Cortisol is a steroid hormone produced in the adrenal glands. When under stress, cortisol instructs the body to direct additional energy to the brain, muscles and heart. Importantly, the hormone allows the body to cope and self-regulate. However, if too much cortisol is produced over an extended period, it can lead to adverse health conditions, such as cardiovascular disease or depression. This new external device, which measures cortisol levels in real-time, could prove essential to the treatment and prevention of these issues, by providing a continuous, non-intrusive and personalised service.

While blood tests can measure cortisol levels, they are invasive and time-consuming. However, working on the premise that cortisol can also be detected in sweat, the Nanolab team has created a wearable patch containing aptamers, or short fragments of single-stranded DNA or RNA that can bind to specific compounds. The aptamer in the patch carries a negative charge; when it comes into contact with cortisol, it binds to the hormone. The device then detects the charge and uses this to measure the cortisol concentration in the wearer's sweat.

To test the device, Nanolab engineers placed the device on Xsensio's proprietary Lab-on-Skin platform, and the sensor is due to be tested in human trials in a healthcare setting. Adrian Ionescu, head of Nanolab explained that, for psychiatric patients suffering from stress, "having a reliable, wearable system can help doctors objectively quantify whether a patient is suffering from depression or burnout, for example, and whether their treatment is effective. What's more, doctors would have that information in real-time."

As sensors become more sophisticated, the number and variety of health-oriented wearables have skyrocketed. At Springwise, we have recently seen wearables such as an earring that monitors [blood sugar](#) levels, a [gait sensor](#) for at-home physiotherapy and an AI-enabled wearable for [monitoring asthma](#).

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Website: [epfl.ch/labs/nanolab](http://epfl.ch/labs/nanolab)

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### **Takeaway:**

While Nanolab is focusing on the use of their sensor in a healthcare setting, their partnership with Xsensio could allow the device to be developed into a consumer product, such as a smart bracelet, to help people to monitor their own stress levels. It is also an excellent example of how researchers and innovators are working together to develop new products. Esmeralda Megally, CEO of Xsensio, [has said](#) the next phase of development, "will focus on product development to turn this exciting invention into a key part of our Lab-on-Skin sensing platform, and bring stress monitoring to next-generation wearables."