

When emotions control objects

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Dimming a light, immersive playing on a computer, and tracking yoga exercises in real time – sensors developed by SmartCardia use various vital signs to transmit data to a host of everyday objects.

The SmartCardia device can be applied to many areas of one's life, from changing the style of music based on mood to giving a new dimension to an avatar to determining a <u>stress level</u>. A small box equipped with sensors, it is smaller than a thoracic belt or even a smartphone. The device detects various vital signs to deduce an <u>emotional state</u>. This information can be sent in <u>real time</u> to all sorts of everyday objects, such as a lamp, a smartphone, a music device or a computer.

The small instrument measures heart rate, respiration, skin conductivity as well as physical activity. The combination of these biological signals indicates the emotional state of the user. For example, variation in time intervals between heartbeats is related to stress level. The conductivity of the skin – organic electrical activity that registers on the surface – is determined by emotional intensity, while breathing is a good indicator of the activity of the autonomous nervous system. By combining these indicators based on the various studies, the device can measure a wide variety of conditions: intensity of stress as well as the levels of excitation or relaxation.

The device has applications in fields such as gaming, augmented reality and <u>virtual reality</u>. "One can imagine bringing a new dimension to a computer game, for example the user must hold his breath when he dives into the water," says Srinivasan Murali, CEO of this spin-off of the



Embedded Systems Laboratory (ESL). "The games and virtual reality environments are more immersive because the vital signs of the player can be sent to the avatar, allowing the user to really feel the environment," adds the CTO, Francisco Rincon. The body's signals and emotions can also be used to determine the color or intensity of the lights and change the music according to mood, thereby enhancing everyday objects as well. The data collected can also be combined with other users to control an object based on the average level of the parameters. For example, a light or music could change depending on the general mood.

The system does not just capture emotions but also allows users to manage their internal state. "For example, one could reduce stress conditions by breathing exercises or games and use the features to prescribe yoga exercises," says David Atienza Alonso, director of ESL. "This is an example of the new generation of intelligent embedded systems. Many features and components can even be modified according to each user's preferences."

Some applications have been developed to validate the system. They should be available starting in 2015. The necessary data will be open access, through programming interfaces and software development kits, so that developers of games and mobile applications can devise new uses.

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