

Visual system that detects movement, colours and textures created in Granada

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Mimicking the way in which a retina works is as hard as it sounds. Scientists from Stanford University, in the United States, have spent the past two years working on imitating the way in which information is processed in biological systems, in other words through the transmission of events in specifically connected networks (where information is captured and transmitted at the same time).

Now a research team from the UGR has evaluated the degree of precision of different models in estimating movement, and have combined the responses of four movement detection cells, two of which are static (on and off), and two transitory (decrease and increase). "One of our developments is a multimodal attention operator, which can detect movement in objects of different colours and textures", Fran Barranco, one of the researchers involved in this project, tells SINC.

The objective of this study, which has been published in the latest issue of the journal *IEEE Transactions on Systems, Man and Cybernetics*, was to combine movement and attention based on information provided by the artificial retina, a visual system capable of selectively capturing moving objects in real time.

The use of an event-driven model, which makes it possible to focus only on areas of activity, has been fundamental, both in the movement processing model as well as in the multimodal selective attention model created in Granada.

One of the most interesting results of the study is the ability to estimate movement reasonably precisely using the responses from each of these cells alone (4% of the information provided by a camera). "By selecting only 10-20% of the information, which we selected on the basis of reliability of the measurements, we obtained precise results at a lower computational cost and with greater stability", explains Barranco. This point is very important in enabling the model to be used in applications with broadband limitations.

The Spanish researchers have also developed 'advanced integrated intelligent sensors', which can pre-process a scene in a manner similar to that used by retinas.

A science fiction future

"We are carrying out reverse engineering. In other words we are trying to study how Nature behaves in order to imitate it, because thousands of years of evolution have created a highly-advanced model adapted to the task for which it evolved", says Barranco.

The devices created have been designed for use in video surveillance and monitoring applications. However, their low energy consumption could make them of great interest in the future for implants in patients or in work to understand the functioning of the brain, and particularly the visual system.

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