Computer simulator allows visually impaired to drive

16.10.2007 › nächste Meldung ›

A team of researchers from the University of Granada [http://www.ugr.es], in collaboration with the University of Murcia, has developed a visual aid device which significantly improves the vision of sight impaired patients; especially those suffering from pathologies with a slow progression that can eventually lead to blindness (such as Macular Degeneration, cataracts, etc.).

This platform, called SERBA (in Spanish, Reconfigurable Electric-optical System for Low Vision), is the first visual aid unit which is very useful in all circumstances and for all tasks, independently of the degree of impairment of the patient. Up to now, in the majority of cases, people with impaired vision had to acquire various different devices to meet all their needs.

The main contribution of this project – undertaken by Mª Dolores Peláez Coca and led by professors Fernando Vargas Martín and Eduardo Ros Vidal, all from the University of Granada – is the implementation of a new optoelectronic platform (based on a reconfigurable device known as FPGA) which is easily reprogrammed so that it can be used in different circumstances. This device will help patients, among other things, to improve their vision when driving.

This platform, as the creator of the research explains, is based on the design of a real-time video processing system able to store several image processing algorithms. "Thanks to the use of a FPGA it is a very flexible device which can be adapted to the user's needs and to the evolution of their disease". Eight patients suffering from Retinitis Pigmentosa (a visual impairment that reduces the field of vision) took part in the device's assessment, as well as six others with different pathologies that generate a loss of sharpness of vision.

Updating through the Internet

The program is stored in the internal memory of the prototype board and the selection of the dump algorithm in the FPGA is carried out automatically. In this way, the images are shown in a transparent viewfinder, similar to those used in the army. With this system, there is no need to purchase a new platform so as to adapt it to the changes that are produced in the disease's development; it is enough simply to update the programmes recorded in the device's memory. This update can be carried out through the Internet, so the support and travelling expenses can be reduced considerably.

So as to prove the viability of the project, researchers from the University of Granada have developed three different image processing computer programmes: edge enhancement, three different kinds of digital zoom lens and the implementation of an augmented view scheme system.

The main advantage of SERBA is that it is easily reconfigured and that it also offers, in researchers' own words, a "technological convergence", as it includes light low-cost cameras, real time image processing and transparent portable viewfinders.

A driving video game

This visual aid system designed by scientists from the University of Granada [http://www.ugr.es] and the University of Murcia has contributed to the creation of bioptical telescopes, anamorphic systems and inverted telescopes that magnify the patient's visibility as it implements zoom lens effects, edge enhancement and edge multiplexing to expand the field of vision. Moreover, a driving video game (with some enlargements in some areas of the image) has been developed to simulate the visual aids previously mentioned. The selection of the area to magnify is supplied by a Head Tracker that the subject carries in a cap.

Several companies have already shown their interest in commercialising this system created by the University of Granada, as SERBA is improving the sharpness of vision

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restricted visual fields and facilitating the subject's mobility.

Antonio Marín Ruiz | Quelle: alphagalileo

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