Emerging Technology Trends

October 17th, 2007 Driving with poor vision becomes possible

Posted by Roland Piquepaille @ 9:19 am Categories: Health & Medicine, Computers & Internet, Science & Nature, Engineering & Innovation Tags: Patient, Vision, FPGA, Strategy, Management, Roland Piquepaille

Spanish researchers have developed and successfully tested a computer simulator allowing visually impaired to drive. This system is called SERBA (short for 'Sistema Electro-óptico Reconfigurable de ayuda para Baja Visión'), which means 'Reconfigurable Electric-Optical System for Low Vision' in English. This innovative system is based on a reconfigurable device known as FPGA (or Field Programmable Gate Array). This means that it can easily be reprogrammed to be used under different circumstances. In fact, if his vision declines, a user of the SERBA system will just download a new version of the software adapted to him, without the need to buy a new device. Some companies are already interested in the system, but there is no information today about commercial availability.



As you can see above, a driver using the SERBA system sees the road ahead of him through a transparent viewfinder, similar to those used in the army (Credit: University of Granada). You can see a larger version of this picture on the Spanish press release of the University of Granada, "Desarrollan un simulador informático que permite conducir a personas con problemas de vista."

Here is a short description of the project. "The main contribution of this project — undertaken by María 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."

So how does SERBA work? "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."

And the software will be updated via 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."

An earlier description of this research work in a previous issue of *Lecture Notes in Computer Science* (LNCS) under the name "Real Time Image Processing on a Portable Aid Device for Low Vision Patients (Volume 3985, Pages 158-163, August 3, 2006). Here is the abstract. "Low vision patients are subjects with very restricted visual fields or low contrast. There are different pathologies affecting this kind of patients. From a functional point of view the residual vision can be classified in three categories: low contrast vision, tunnel vision and peripheral vision. This contribution describes simple real-time image processing schemes that can help this kind of patients. The presented approaches have been implemented in specific hardware (FPGA device) to achieve real-time processing with low cost portable systems. This represents a very valid alternative to optical aids that are widely used in this field."

Finally, you might want to read this article published in Spanish by *Portal Universia* on August 27, 2007, "Personas Con Problemas Vision Podran Conducir Mediante Simulador Informatico, which contains additional details (in Spanish).

Sources: University of Granada, Spain, September 14, 2007; and various websites

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Caution

Call me prejudiced (I'm sure some people will), but what happens when the system fails? Dead battery? Failed LCD on the road? When the user's special glasses fall off when he jerks his head? When ... (Read the rest)

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