http://www.zju.edu.cn/jzus http://www.springerlink.com
38 Zheda Road, Hangzhou, People's Republic of China, 310027
Tel: +86-571-87952276; Fax: +86-571-87952331

Journal of Zhejiang University SCIENCE A ISSN 1673-565X (Print); ISSN 1862-1775 (Online)
Journal of Zhejiang University SCIENCE B ISSN 1673-1581 (Print); ISSN 1862-1783 (Online)
Journal of Zhejiang University SCIENCE C ISSN 1869-1951 (Print); ISSN 1869-196x (Online)

23 Dec, 2009

Certification on SCI indexing

This is to certify that on 25th, June, 2009, Dr. Oscar DENIZ, Dr. Modesto CASTRILLON, Dr. Javier LORENZO, Dr. Luis ANTON, Dr. Mario HERNANDEZ and Dr. Gloria BUENO contributed their paper *"Computer vision based eyewear selector"* to JZUS-A (ZUSA-D-09-00377), and under our journal rigorous international peer reviewing (reject rate is about 78%, calculated among a total of more than 1230 contributions to JZUS-A), their paper was accepted for publication by JZUS-A on 27th November 2009.

Due to our journal's adjusting and development according to world-class publishing standards, we split the Computers & Electronics area into the new journal JZUS-C beginning in 2010. So some papers accepted by JZUS-A in 2009 will be published in JZUS-C depending on their topic. Their paper will be published on JZUS-C, in the second issue, 2010 (http://www.zju.edu.cn/jzus/current.php#c).

So in order to protect the authors' copyright and safeguard the paper's quality, we hereby offer the official certification to prove that this paper was accepted by our SCI journal (JZUS-A) in 2009 and should retain full merit for that.

Sincerely

Helen ZHANG, managing editor
Journals of Zhejiang University SCIENCE (A/B/C)
http://www.zju.edu.cn/jzus
www.springerlink.com
jzus@zju.edu.cn
Tel: +86-571-87952276 / Fax: +86-571-87952331

Journal of Zhejiang University-SCIENCE C (Computers & Electronics)
ISSN 1869-1951 (Print); ISSN 1869-196X (Online)
www.zju.edu.cn/jzus; www.springerlink.com
E-mail: jzus@zju.edu.cn

Computer vision based eyewear selector

Oscar DÉNIZ[†1,2], Modesto CASTRILLÓN[1], Javier LORENZO[1], Luis ANTÓN[1], Mario HERNANDEZ[1], Gloria BUENO[2]

([1]Instituto Universitario de Sistemas Inteligentes y Aplicaciones Numéricas en Ingeniería, Universidad de Las Palmas de Gran Canaria, Edificio Central del Parque Científico-Tecnológico 35017 Las Palmas, Spain)

([2]E.T.S. Ingenieros Industriales, Universidad de Castilla-La Mancha Campus Universitario, Avda. Camilo José Cela, s/n 13071 Ciudad Real, Spain)

[†]E-mail: Oscar.Deniz@uclm.es

Received June 26, 2009; Revision accepted Nov. 28, 2009; Crosschecked Dec. 8, 2009

Abstract: The widespread availability of portable computing power and inexpensive digital cameras are opening up new possibilities for retailers in some markets. One example is in optical shops, where a number of systems exist that facilitate eyeglasses selection. These systems are now more necessary as the market is saturated with an increasingly complex array of lenses, frames, coatings, tints, photochromic and polarizing treatments, etc. Research challenges encompass Computer Vision, Multimedia and Human-Computer Interaction. Cost factors are also of importance for widespread product acceptance. This paper describes a low-cost system that allows the user to visualize different glasses models in live video. The user can also move the glasses to adjust its position on the face. The system, which runs at 9.5 frames/s on general-purpose hardware, has a homeostatic module that keeps image parameters controlled. This is achieved by using a camera with motorized zoom, iris, white balance, etc. This feature can be specially useful in environments with changing illumination and shadows, like in an optical shop. The system also includes a face and eye detection module and a glasses management module.

Key words: Face detection, Eye detection, Perceptual user interfaces, Human-computer interaction
doi:10.1631/jzus.C0910377 **Document code:** A **CLC number:** TP391.4

1 Introduction

The widespread availability of portable computing power and inexpensive digital cameras are opening up new possibilities for retailers in some markets. One example is in optical shops, where a number of systems exist that facilitate eyeglasses selection. These systems are increasingly necessary as the market is saturated with an increasingly complex array of lenses, frames, coatings, tints, photochromic and polarizing treatments, etc. (Roberts and Threlfall, 2006). The number of clients can increase only if the selection process is shortened or automated. A number of deployed systems have already demonstrated that eyeglasses selectors can increase sales and customer satisfaction (Kuttler, 2003; Morgan, 2004).

From a research viewpoint, such systems represent an interesting application of Computer Vision, Multimedia and Human-Computer Interaction. The Augmented Reality (see a survey in Azuma (1997)) of watching ourselves and trying different 'virtual' spectacles can be achieved by combining computer vision and graphics. The Magic Lens and Magic Mirror systems, for example, use the ARTag toolkit (Fiala, 2004), which mixes live video and computer-generated graphics. People can wear cardboard patterns that ARTag can detect. The graphics are placed in the visible positions of the patterns. The system can work in real time on general-purpose hardware, although people have to wear the cardboard. Another approach was taken by Lepetit *et al*. (2003), where virtual glasses and moustaches are added to live video. Although the system works with an impressive frame rate of 25 Hz, the user must start the tracker by reaching a position close to a generic triangle-based face model shown on the screen. The ARMirror is a kiosk-based entertainment setup that shows live video overlaying virtual hats,

Storring, M., Moeslund, T., Liu, Y., Granum, E., 2004. Computer Vision Based Gesture Recognition for an Augmented Reality Interface. 4th IASTED Int. Conf. on Visualization, Imaging, and Image Processing, p.766-771.

Swain, M.J., Ballard, D.H., 1991. Color indexing. *Int. J. Comput. Vis.*, **7**(1):11-32. [doi:10.1007/BF00130487]

Velasquez, J., 1997. Modeling Emotions and Other Motivations in Synthetic Agents. Proc. AAAI Conf., p.10-15.

Velasquez, J., 1998. Modeling Emotion-Based Decision Making. *In*: Canamero, D. (Ed.), Emotional and Intelligent: The Tangled Knot of Cognition. AAAI Press, Springer Netherlands, p.164-169.

Viola, P., Jones, M.J., 2004. Robust real-time face detection. *Int. J. Comput. Vis.*, **57**(2):137-154. [doi:10.1023/B:VISI.0000013087.49260.fb]

Visionix, 2007. 3DiView 3D Virtual Try-on. Available from http://www.visionix.com [Accessed on July 30, 2007].

Wagner, S., Alefs, B., Picus, C., 2006. Framework for a Portable Gesture Interface. Proc. 7th Int. Conf. on Automatic Face and Gesture Recognition, p.275-280. [doi:10.1109/FGR.2006.54]