Abstract

The use of stereoscopic methods brings about a new dimension to representations and improves the understanding of the represented object, thus increasing the viewer's interest in what he can see. However, stereoscopic techniques, which were first used almost two centuries ago, are still quite unknown and rarely used in scientific fields or in teaching. It seems as if stereoscopic techniques were only in the hands of the gurus of the cinema industry and if its foundations basics had been forgotten, just in a moment in history when new technologies are opening a whole new world of possibilities.

This thesis aims at putting together the historical and technical aspects of stereoscopy in a single document that could become a guide for those who want to incorporate stereoscopy as a complementary way of expression in any field of science or in teaching. For this reason, the focus of this study is not on one single specific matter, but on providing an overview of the stereoscopy problem and on sorting out some particular shortcomings that have been identified in the practice of stereoscopy, making new contributions from both a technical and a historical point of view.

It is important to contextualize contents, analyzing their background and history, starting with the main protagonists and their most relevant contributions. It is also necessary to pay special attention to the psychophysiological aspects of vision, which are determinant in the phenomenon of stereoscopic perception, always taking into consideration the most relevant studies in the field of visual comfort.

All this should make it possible to identify the key parameters in stereoscopic perception and the factors that may cause perceptual distortions. Bearing these in mind, a new methodology of stereoscopic capture has been designed to establish the optimal parameters, which should ensure a comfortable viewing experience without any perceptual distortions.

Current 3D displays and their supported media formats have also been analyzed. That is the case of modern 3D TVs and websites specialized on showing stereoscopic contents over the net. As a result, an effective and practical methodology, based on free software, has been provided. This should allow anyone to prepare and edit stereoscopic contents either in the form of images or videos.

Spherical panoramas have become highly appreciated in architectural representation and virtual reality techniques, but a stereoscopic version of this type of panoramic images had never been considered before. That's why, a method to capture stereoscopic spherical panoramas has been designed. The considerations to develop a specific viewer have also been highlighted.

A thorough bibliographic search has been carried out, as well as a comparative analysis of the publications with stereoscopic drawings related to graphical expression. Some examples of the few early applications of stereoscopy to science have also been highlighted, bringing to light some inedited cases.

Finally, some research has been done to get the stereoscopic photographs of the city of Valencia taken by some commercial publishers in the nineteenth century. These photographs will recover the memory of various lost architectural monuments, and the city urban features of this period will be shown in stereoscopic vision.