

Chapter XII

Virtual Community Practice Toolkits Using 3D Imaging Technologies

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ABSTRACT

Extending visual communications to the third dimension (3D) has been a dream over decades. The ultimate goal of the viewing experience is to create the illusion of a real environment in its absence. However limitations of visual quality and user acceptance prevented the development of relevant mass markets so far. Recent achievements in research and development triggered an increasing interest in 3D visual technologies. From technological point of view, this includes improvements over the whole 3D technology chain, including image acquisition, 3D representation, compression, transmission, signal processing, interactive rendering and 3D display. In the center of all these different areas, the visualization of 3D information stands as the major aspiration to be satisfied, since 3D enriches the interaction experience. This enhanced user experience that 3D imaging offers compared to 2D, is the main reason behind the rapid increase of the virtual communities using and managing 3D data: Archaeological site 3D reproductions, virtual museums (in the field of cultural heritage); 3D plays, special effects (in the field of entertainment); virtual classes (in the field of learning) are only some examples of the potentialities of 3D data. It's clear that 3D imaging technologies provide a new and powerful mechanism for collaborative practicing. In this context, this chapter focuses on the utilization of 3D imaging technology and computer graphics, in various virtual communities in the domains of education, cultural heritage, protection, commerce, and entertainment.

INTRODUCTION

“Virtual community” reflects the social, political and economic impact of information and communications technology, changing the architecture of interaction (Hummel, 2002). In the last decade, utilization of three-dimensional (3D) information in virtual communities has become more widespread since 3D enriches the interaction experience and due to the rapid advances in computer graphics, capturing technology, image-based rendering methods and VLSI systems.

3D digital technology is a diverse group of various technologies and products, and many related issues need attention. Apart from technical problems, there are also issues like price, producibility, demand, applications, market segments, sizes, market penetration schedules, etc. However, applications that require 3D imaging first emerged over a century ago. The general public has been excited about 3D stereophotographs since the 19th century, 3D movies in the 1950’s, holography in the 1960’s, and 3D computer graphics and virtual reality in collaborative practicing today. The 3D-image systems provide both physiological and psychological depth cues required by the human visual system to perceive 3D objects and thus offer a more “real” experience compared to 2D-image systems.

According to Hammann (Hammann, 2000) a virtual community is characterized by:

1. A clearly defined group of people
2. The interaction between the members
3. The bonding among the members
4. The common place - the electronic medium that facilitates interaction.

To this target, the new 3D imaging technologies provide a powerful mechanism for practicing in virtual communities, enhancing the experience of people gathering and communicating in an online

“space”. Archaeological site 3D reproductions, virtual museums (in the field of cultural heritage); 3D plays, special effects (in the field of entertainment); virtual classes (in the field of learning) are only some examples which prove the idea that 3D imaging technology can facilitate community based collaboration: User communities can utilize 3D to build novel designs from scratch or tailor existing pre-defined/default designs.

In this chapter, we first present the basic principles for the 3D imaging and some general applications of 3D technologies. Then, we focus on the utilization of the 3D imaging technology and its components in virtual communities in the domains of education, cultural heritage, protection, commerce and theater, by presenting specific projects, in which the authors participated or currently participate. We also try to forecast the near future in virtual communities. The final section summarizes and concludes the paper.

THREE-DIMENSIONAL IMAGING TECHNOLOGIES

A picture that appears to have height, width and depth is three-dimensional (3D) in contrast to two-dimensional (2D) image which has no depth (Franklin, 2008). 3D imaging consists of a long chain of acquiring, compressing, transmitting and visualizing 3D images. Real scenes can be captured and encoded into 3D data, which are sent over the network and decoded on user’s terminal, to be animated (see Figure 1).

Hundreds of different principles, ideas and products for 3D imaging have been presented especially during the last decade. Two main categories can be identified in 3D imaging solutions according to user’s display: 3D computer graphics, which trick eyes into thinking that the flat 2D screen extends depth and systems that employ 3D displays which provide full 3D experience.

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