Chapter XV

Creating Augmented Virtual Environments

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Abstract

An augmented reality fuses computer graphics onto images or direct views of a scene. In a new alternative augmentation approach, a real scene is captured as video imagery from one or more cameras, and these images are used to augment a corresponding 3D scene model or virtual environment. This arrangement is termed an augmented virtual environment (AVE) and it produces a powerful visualization of the dynamic activities observed by cameras. This chapter describes the AVE concept and the major technologies needed to realize such systems.
Introduction

Most augmented realities fuse computer graphics onto images or direct views of a scene. This chapter describes an alternative augmentation scenario that offers unique capabilities and challenges. In this alternate form of augmented reality, a real scene is captured as video imagery from one or more cameras and these images augment a corresponding 3D scene model or virtual environment. This arrangement is termed an augmented virtual environment (AVE) and it produces a powerful visualization of dynamic activities occurring over wide and occluded areas (Figure 1).

This chapter describes the AVE concept and its benefits. In addition, the chapter details solutions to the major technologies needed to realize such systems as well some technical barriers that are yet to be overcome.

Figure 1. An AVE visualization is created by projecting camera images (a-e) onto 3D models (f) to produce arbitrary views (g, h), in this example, for an area in Washington, DC.
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