A Collaborative Real Time Previsualization Tool for Video Games and Film

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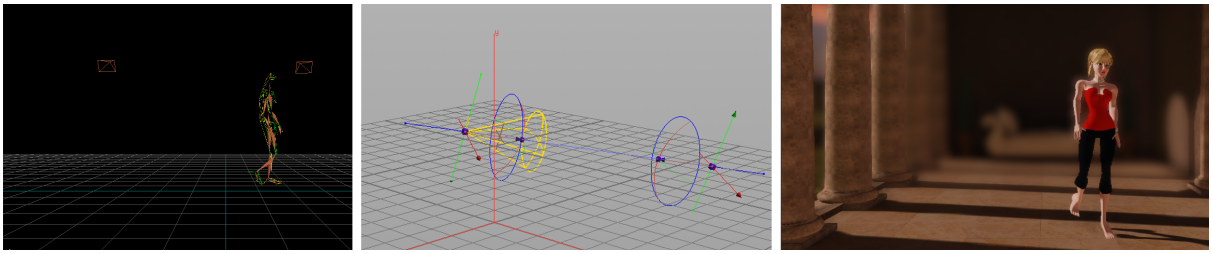

Figure 1: *RTFX previs scenario combining real time motion capture (left) with light assets from Houdini (middle) into a UDK set.*

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1 Introduction

The video game and film industries use previsualization (previs) to produce preliminary animations, walk-throughs and still images of scenes, levels and other assets. Using these collaborative planning tools early in the production pipeline reduces costs later on by providing a consistent and detailed cinematographic vision. Most of the previs literature addresses the problem of camera calibration and shot planning [Nitsche 2008]. Gouchet et al. [2007] developed a natural interface for filming a virtual scene using a real camera. Mori et al. [2011] presented an on-set stereoscopic previs method that employs 3D models of characters and sets to calibrate and plan 3D shots.

However, previs is a valuable tool for several other tasks in film and gaming: planning complex motion and character animation; efficient construction and compositing of special effects; designing engaging video game levels. These tasks require cooperation and cohesion amongst the existing previs tools; currently, these tools do not incorporate camera work with digital asset construction and planning. We present a chat-like client-server architecture for connecting previs tools. Our demo implementation connects several graphics animation packages with mocap data feeds and game engines for real-time rendering.

2 Approach

Existing previs tools tend to specialize on a single, specific data producing and rendering task. Consequently, the production pipeline uses several different tools and packages (e.g., Autodesk's MotionBuilder for camera visualization and Maya for mesh construction; Side Effect's Houdini for special effects). Our design focuses on connecting **any** set of graphics or capture applications together to produce a single, unified previs scene. This connection provides a collaborative environment where many individuals can contribute assets and enhance the shared vision.

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Our solution, RTFX (real-time special effects) [Lesley Northam and Kaplan 2011], uses chat-like communication between a central RTFXServer and a number of RTFXClients. Each previs tool uses an RTFXClient plug-in that sends messages consisting of assets and scene data (e.g. camera position and meshes) to the RTFXServer. In return, each client receives messages from the server that contain assets and data from the other clients in the network. This framework is generic in that RTFXClient plug-ins can be written for any animation application or game engine.

3 Discussion

We have tested RTFX in a variety of previs and virtual production scenarios, including one that connected a 16-camera Vicon mocap volume (with both live actors and pre-recorded data), Side Effect's Houdini animation package, the Unreal Development Kit (UDK) and the Unity game engine. Another demo procedurally generated a 3D game level inside Side Effect's Houdini and then visualized it **live** in the Unity game engine, so when the artist manipulated the level in Houdini, they received immediate visual feedback through Unity. This completely bypassed the traditional and costly export-import pipeline for constructing game levels.

Our experiments concluded that RTFX can be used for real-time visualization of motion capture (including actors from multiple capture volumes within a single video feed), special effects (including particle systems and explosions) and game level construction. We also demonstrated compatibility with existing previs tools, including real-time visualization of camera work including depth of field.

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