

“13 Ways to Die at Home”: Inserting 3D into Degraded Film Footage (sap_0098)

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1 Introduction

Adding 3D animation to motion picture footage is often challenging, particularly when the film footage is severely damaged or degraded. Pristine 3D renders look out of place against faded film stock color and compression artifacts. Film grain, frame weave, and interlacing thwart standard 2D tracking practices. Such issues were encountered during the production of “13 Ways to Die at Home,” a short film in which I inserted animation into shots derived from public domain instructional film. Solutions necessitated the creative use of simple compositing and animation techniques.

2 Exposition

The source footage for “13 Ways to Die at Home” was derived from on-line material stored by the Prelinger Archive. Since the archive stores hundreds of hours of material, the footage is highly compressed. Popular compression schemes include MPEG2, Cinepack, and Real Media. In most cases, the resolution is kept at 320x240. Normally, such limitations would prevent the incorporation of such footage for any computer-animation project. However, the degraded nature suited the tongue-in-cheek quality of the film, wherein the audience is warned of surreal dangers found in and about the home. Nevertheless, I had to tackle the following problems.

Compression and scale artifacts: In order to master “13 Ways to Die at Home” in DV (720x480 with non-square pixels), I scaled the source footage up by 200%. This exaggerated the compression artifacts, which were manifested as a vertical “ribbing.” In addition, edges with high contrast become stair-stepped as the original pixels became more apparent. Since the artifacts could not be removed, I added similar artifacts to the 3D renders during compositing phase. This was achieved through the layering of the original 3D render with a semi-transparent, pixilated version of the same render. The pixelization came courtesy of the Mosaic plug-in, which is a standard plug-in available in Adobe After Effects.

Limited color palette: Due to film stock which had chemically faded or shifted over many decades, the color space of each shot varied wildly. While a few shots had become dull and washed-out, others had a disposition for a particular part of the color spectrum, such as pink or cyan. To complicate matters, the compression schemes imposed on the video files created posterization. To match the color aesthetic, I applied combinations of standard After Effects color plug-ins, including Color Balance, Curves, Hue/Saturation, and the ubiquitous Brightness & Contrast.

Frame weave: Both nitrate and safety motion picture stock shrinks over time. Unfortunately, the shrinkage is not even and becomes apparent as a left-right “film weave” once the footage is digitized. When the weave is combined with heavy film grain, the 2D tracking of 3D rendered elements within the composite becomes difficult if not impossible. In

such a situation, specific pixels rapidly move back and forth or seemingly disappear under shifting color. With the shots chosen for “13 Ways to Die at Home,” the Track Motion and Stabilize Motion tools within After Effects failed to produce satisfactory results. The tracking tools within Autodesk Combustion suffered from similar difficulties. Hence, I chose to track the renders the good, old-fashioned way: by eye. Thus, each rendered element was keyed along a path. Borrowing from traditional animation techniques, critical positions were keyed first, and then secondary, in-between positions were keyed second. In the end, most rendered elements required position keys spaced 5 frames apart (the frame rate for the project was 29.97). In order to place elements appropriately behind objects in each shot, animated mattes were added. These were also keyed every 3 to 5 frames. When needed, shadows were also generated by adapting an additional copy of each rendered element.

Interlace ghosting: Since the footage was digitized and compressed into a video movie by the archive, converted into static frames for compositing on my end, then returned to interlaced DV, some of the interlacing artifacts became “trapped.” That is, the interlace ghosting was exaggerated on rapidly moving objects. Although interlacing can be removed with proper compositing and deinterlacing plug-ins, it served as an interesting challenge to selectively add the effect to the 3D renders. To do this, I stacked multiple versions of each element in the composite, each offset by 1 frame. Since the interlace ghosting was not continual, the opacity of each layer was animated changing over time.

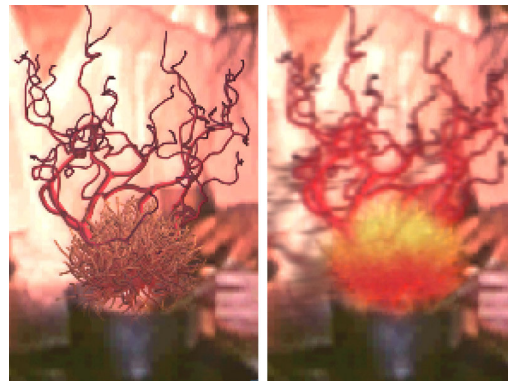


Figure 1: (Left) 3D render of alien plant composited on top of old motion picture footage (Right) Same render integrated with compositing techniques that insert appropriate artifacts

3 Conclusion

To successfully add the artifacts of old motion picture footage to 3D renders, the creative use of common compositing plug-ins and animation techniques was required for the short “13 Ways to Die at Home.”

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