MotionGraphix: A 2.5D Stereoscopic Animation System On Your iPad

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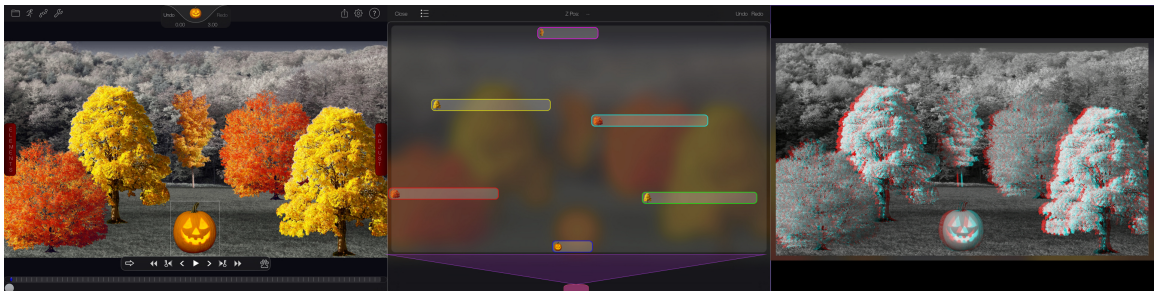

Figure 1: *Motion Graphix 2.5D animation system: 2D elements with perspective (left) are layered with different Z-depths as seen in a bird's-eye representation of the scene (center) resulting in an anaglyph composite of the stereo pair created by rendering the scene with a stereoscopic transformation.*

Abstract

MotionGraphix is the first stereoscopic 2.5D animation system for the iPad. It combines powerful, professional-level animation features like keyframing and algorithmic motions with a wide variety of graphic element types, from text or animated sprites to particle systems and replicators. MotionGraphix includes a set of ready-to-use motion templates, a variety of sprites, or cutout images, and some background images. These elements, in conjunction with the inline help system and online tutorials, make MotionGraphix easy to learn, while the depth of features make it suitable for producing professional quality animations.

Keywords: sprite, animation, 2.5D, stereoscopic

Concepts: • **2.5D animation, stereoscopy**

1 Getting Started - Backgrounds

Motion graphics projects generally start with a background image or video. In MotionGraphix the artist begins by choosing a photo, a segment from a video, or a solid/gradient background. High-performance GLSL image filters can be applied to this background providing keyframe-animated color correction and artistic stylization options. Artists working in stereo can also import stereoscopic stills and movies in side-by-side or top-and-bottom format. MotionGraphix will automatically split the input and create stereo output pairs that will use the appropriate background when rendering.

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2 Graphic Elements

Small cutout images with a transparent background are traditionally referred to as sprites, and MotionGraphix includes a library of both animated and still sprites, as well as letting artists import their own. Animated sprites can either be imported as animated GIF-format images, or as a static 'sprite atlas', an image with a grid of figures representing the different frames of a short animation. Such animations are typically short loops, like a walk cycle, so combining the animated sprite with a simple motion can create the appearance of much more sophisticated animation. This technique is commonplace in video games, but can be seen even in classic Disney animations.

MotionGraphix makes it convenient to define custom sprites by simply cutting them out of an existing image. Using Bezier splines to outline a figure in a picture, the artist can define and

Figure 2: *Cutting a sprite: Bezier curve defines a mask, edge softening helps blend cutout over background.*

save that cutout as a standard sprite. Sprites can also be defined from text, with control over typeface, fill and outline colors, justification, etc.

MotionGraphix also lets an artist define elements from standard 2D shapes with fill and outline colors, or from closed Bezier curves. These shapes can then be animated using the standard transformations as well as by animating their shape parameters, creating 'morphing' animations. Any of these elements can also render their own animated drop shadows, to create the illusion of lighting on 3D elements.

3 Animation

3.1 Keyframe animation

MotionGraphix uses a highly intuitive 'automatic keyframe' animation system where artists directly position elements, adjust the time, then adjust at the new time, until the motions are all complete at the last frame of the animation. Non-positional parameters (i.e. opacity) are also automatically keyframed when adjusted at a new time. This workflow can be grasped immediately, even by children, and makes it fast and easy to animate elements. For more precise editing of keyframed values, MotionGraphix provides a keyframe editor for precisely adjusting relative timing of various animated channels.

Figure 4: *Keyframe editor shows keys on animated channels*

Another powerful keyframe animation technique, introduced in our previous contribution, SpriteDance, is Digital Tracking. An artist using the Digital Tracking system simply slides their digit over the animation as it plays, and MotionGraphix captures the positions into a keyframed animation which can be applied to any graphic element. Animations can also be saved and applied to different elements.

3.2 Algorithmic animation

MotionGraphix can also animate elements using a number of parametrically controlled behaviors, from simple fade in/out, to spirals or physically-based bouncing. More complex results can be produced using a set of build-in particle system effects, like fire or snow, which emit and animate sets of sprites automatically based on simple behavior rules and a handful of ensemble parameters with variable randomization. Similarly, MotionGraphix includes 'replicators', which combine a user-input path with procedural generation and growth of a set of graphic elements (i.e. a growing leafy vine). Because these animations are algorithmically generated, it is simple to edit their parameters to change the animation.

Figure 4: *Bounce motion path visible on basketball sprite*

4 2.5 D Workflow

The term 2.5D animation refers to the animation of flat (2D) graphic elements in a virtual 3D space. The illusion of depth in the 2D animation is created by applying a perspective transformation to all elements based on their associated 'Z' coordinate, which the animator can control and keyframe in coordination with usual the X and Y coordinates. The Z coordinate is also used for element layering, so nearer elements obscure those behind it. By using a stereoscopic perspective transform, elements can be rendered with depth-appropriate parallax into stereo pairs, and formatted for anaglyph, 3DTV, or VR display viewing. The perspective and stereo transforms are based on a user-adjustable camera model, allowing artists to approximate the camera used for background footage.

Figure 5: *Timeline editor adjusts elements' lifetimes*

References

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