

# “Myth: A Frozen Tale” - Stylized Effects for Real-Time VR

Ian J. Coony  
Walt Disney Animation Studios

Michael R.W. Anderson  
Walt Disney Animation Studios

Dan Lund  
Walt Disney Animation Studios



Figure 1: Myth VR progression (from left-right) Cabin intro, Gale, enchanted forest ablaze, the Nokk, Earth Giants

## ABSTRACT

With “Frozen 2” wrapped in late summer 2019, a small team of effects artists set out to learn an entirely new element creation pipeline, utilizing real-time technology at its core. These artists were able to build upon experience gained from previous VR efforts at the studio including “Cycles” [Gipson et al. 2018] and “a kite’s tale” [Wright et al. 2019]. With an aggressively short schedule and the unflagging support of their Myth peers, the team created uniquely stylized artwork using a new palette of tools to help translate these designs into real-time effects.

## CCS CONCEPTS

• Computing methodologies → Real-time Rendering; Stylized Effects Creation for VR;

## KEYWORDS

Animation; Real-Time Effects; Virtual Reality; VR;

## ACM Reference Format:

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## 1 INTRODUCTION

Myth is a seven minute VR short allowing the viewer to experience the world of “Frozen 2” told as a boldly graphical bedtime story. Its designs draw heavily from the creative shape language of the movie. The effects team combined real-time technology with hand-drawn animation to represent the elemental spirits of earth, wind, fire, and water. Guided by this unique design approach, artists helped to integrate stylized effects into a fantasy storybook environment.

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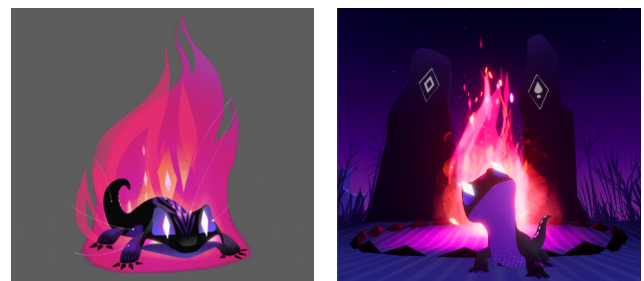
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This work was essential in helping transport the viewer to a space where Myth could come to life. The following sections illustrate a few of the design and technical challenges encountered during production, including some unique solutions.

## 2 AN ENCHANTED FOREST

As the experience unfolds, the viewer listens to a bedtime story being read in front of a warm crackling fireplace. For the fine details that help add life and viscerality, animators utilized Unreal Engine (UE4, editor) Cascade GPU-based particles for control of swirling fireplace embers. This choice allowed support for customized Houdini vector fields, yielding precise shape design without reliance on random noise and other forces at runtime. Fireplace flames were created using the Houdini Game Development Tools suite and rendered in Mantra. The “Make Loop” OTL generated animated looping fire sequences for snippets that were strategically arranged on cards in the editor. While transitioning from the cabin fireplace to the enchanted forest, timed visual cues were employed to help drive focus. Particulate embers and geometry leaf emitters were a good example of this technique. These were utilized to ensure a seamless transition across the fade, as one level was loaded into memory and another removed. The team took advantage of a variety of post-processed fade and volume effects in creative ways to smoothly transition the viewer.



(a) Original production design (b) 2D fire loops on 3D particles

Figure 2: The Myth Fire Salamander

### 3 GALE AND THE FIRE SALAMANDER

The enchanted forest is revealed by rustling leaves and silhouetted wind-blown foliage. Emerging alongside the viewer, a flowing textural representation of the wind spirit named “Gale” weaves gracefully in and around the environment. Fluttering butterflies can be seen in the distance, helping to support that this world is alive. The butterflies were animated using Houdini CHOPS then exported via FBX format into the editor. Once set up as an asset, these were loaded as a level of editable spline paths. This gave discrete control of the butterflies to dart in and around the animated foliage. Spawning these paths directly into Sequencer was problematic due to the way they initialized to a single point at runtime. Animators opted instead to layer them in as a sub-level of customized paths. Gale was brought to life by animators with Disney’s in-house VR mocap spline tool, “Swoop”. This data was converted to shaped geometry using a Houdini Trail SOP and textures were animated along the UVs for the character’s wind-like motion. Custom leaf simulations were exported from Houdini with the help of vertex animated textures, then imported directly into the editor as an asset. During this section of the story, Gale quickly engulfs the viewer in a whiteout snowstorm. This was created primarily using camera-facing CPU snowflakes. A shader-based post-process volume material was added to control the density of specific areas of the storm for visual clarity. Bruni the fire salamander is introduced at the point the storm clears and burns down the entire forest. These effects were created using hand-drawn fire loops (Fig. 2b) and translucent particles for Bruni’s flaming trails.

### 4 REIGN OF THE NOKK

Elemental spirits save the day as the water horse, Nokk, summons rain to make quick work of the fiery conflagration. The rain and ground splashes were initially conceived using UE4 Niagara, but later converted to GPU particles for better VR performance. Drawn 2D ripples were added to the Nokk to capture interaction with the surrounding water. Ripple sprites were emitted based on hoof positions precalculated in Houdini then fed into Niagara particle systems as .csv point attribute data. The forest quickly floods in a deluge of water created utilizing a combination of animated vertex shaders, splashing sprites, and instanced geometry. Drawn 2D image sequences were set up as media source assets and loaded directly into Sequencer for retiming and placement. This avoided sync issues experienced using QuickTime (h264) files as movie textures and also allowed frame accurate timing.

### 5 EARTH GIANTS AWAKEN

The flood subsides revealing a calm daytime forest complete with early morning tulle fog and graphic waterfalls. Birds and ambient falling leaves help immerse the viewer in nature as the Earth Giants awaken. Fog simulations were used to mask areas of less importance, helping to guide the viewer. These were created using a CPU particle emitter paired with a sprite atlas material of rendered Houdini volumes. The story progresses and a massive giant knocks over an aspen tree close to the viewer. Effects artists modified the existing “Frozen 2” tree simulation rig to work with the stylized tree designs. This used a combination of Houdini Bullet and Vellum solvers to simulate motion of the falling trunk and branches. Tree

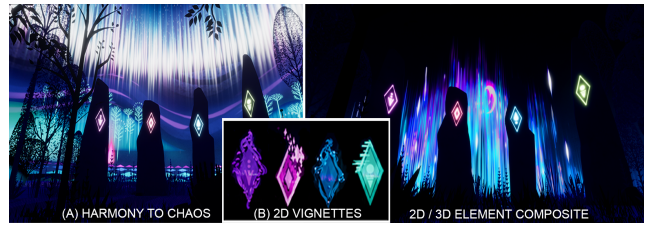


Figure 3: Fifth Spirit Chaos Progression

animation was exported as vertex animated textures to an editor asset, then retimed in Sequencer using a keyframeable “myTime” shader parameter. Geometry instanced debris and volume textured sprites served to help with dirt and debris pickup where needed.

### 6 FIFTH SPIRIT CHAOS

Harmony turns to chaos during the crescendo as elements begin to fall out of synchrony. One effect taken directly from “Frozen 2” was dubbed, “Crystal Ice Visions”. With the assistance of character animation for motion and animatic timing, Houdini artists ported this element by translating point data directly into the editor. This data drove the crystals using vertex animated texture maps. The music builds and hand-drawn elemental vignettes materialize directly in the foreground (Fig. 3B). These image sequences were imported as media assets and synced to the audio track by sliding them in Sequencer to match the music beats. Much of the emotional arc of these effects was driven by music. In the case of “Harmony to Chaos” effects (Fig. 3A), blueprint visual scripting was used combined with digital signal processing to drive waveform effects animation at runtime. This approach created unwanted glitches while testing playback in VR. The team opted to capture runtime rendered image output of this effect using custom Sequencer render passes. This allowed baking the real-time images out as placeable cards and helped to further optimize framerate.

### 7 CONCLUSION

Finding the optimal balance between technology, art direction, sound, and visuals was only part of the work for the Myth team. It was equally important to embrace the designs and unique shape language of these effects and to encourage creative use of scale and space. The constraints of time and technological limitations helped foster creative effects solutions to many of these technical challenges.

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