

Breakdown Sheet

Technical Effects Reel 2012



FX - Nightmares - Pitch's nightmares from Rise of the Guardians was an integral part of the film. I worked extensively on this character FX across many shots, all of which were quite unique in some way. For this FX, I am responsible for the trailing ribbon simulation/grooming, the black sand and lighting/rendering.

- SideFX Houdini
- Proprietary Tools



FX - Black Sand - Working with black sand particle effects was a major part of my work on Rise of the Guardians. In this shot and the one after, I am responsible for the particle simulation used to demonstrate Pitch's control and manipulation of sand.

- SideFX Houdini



FX - Sled Snow - In these select shots, I was responsible for simulating layers of particle effects to accurately depict the advection of snow bits in the path of Santa's sleigh.

- SideFx Houdini
- Proprietary Tools



FX Dev - VOPS Flocking System - In this procedural effects piece inspired by marine life and the Planet Earth documentary, I focused on creating a highly flexible system for simulating various flocking behaviors for schools of fish. The logics behind this system was loosely based on the research of Craig W. Reynolds and his 1987 Technical Paper titled "Flocks, Herds, and Schools: A Distributed Behavioral Model." Built from the ground up using a wide variety of VEX nodes and expressions in Houdini, this flocking system features rudimentary steering behaviors common in autonomous systems, namely Separation, Alignment/Cohesion, Obstacle Avoidance, Path Following and Wandering. Obstacle avoidance is achieved by shooting a ray from each particle in the direction of the particle's velocity vector. If the ray hits a primitive, it takes the normal of that primitive and apply a near inverse steering force to the particle. Functionality for Cohesion is achieved by averaging out the velocity of neighboring particles and applying that average as the new velocity for that group. Path Following and also Wandering is achieved by using Edge Normals to drive acceleration. As with the other tools that I develop, variables are propagated up to create artist-friendly parameters to control every aspect of the flocking system, including geometry, varying animation relative to acceleration, and thresholds for adjusting influences on neighboring particles.

Kindred Dance is a major experiment in effectively putting the tools I develop to use on a project that is ultimately true to life and it's representation of nature.

- SideFx Houdini



FX Dev - Kelp Asset - The kelp forest is constructed entirely from a fully customizable kelp asset with integrated wire solver and dynamic forces. Houdini's procedural workflow, as well as an extensive use of trigonometric expressions allowed me to fully capture the gracefulness and uniqueness of an underwater kelp forest. A low density volumetric smoke adds visibility to light rays and caustic map. Added falloff of color values is produced by a Houdini VEX Z-depth fog shader. For the kelp blades, In order to achieve a look that is true to my reference, I wrote a shader to produce translucency and color based on light angle and intensity.

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- SideFx Houdini



Houdini Technical Rigging - Plant Asset – This plant was done as part of a group project, where I was responsible for creating the extensive procedural engine and user-friendly controls used to drive the animation. Under the hood is an innovative system that uses just one bone chain to drive the animation on every other part of each leaf. A bone chain's two positions are blended to create an animation, which in turn drives a curve. The other curves use the curled position of the last curve to blend with their original position. Geometry is then captured from curve proximity. Translation values for curve points are read into Channel nodes at real time, and can be lagged to create different animation speeds for each leaf. A wide array of expressions and vector math was used to reference relative point positions for later use. Emphasis was placed on ease of control for animators and so internal procedural variables were propagated up as simple to use parameters which can then be keyframed.

- SideFX Houdini



Cloth Shader – This cloth shader utilizes the cellnoise() function of the RenderMan Shading Language to drive displacements. Parameters were created to control the iterations of the resulting voronoi cells and the value falloff from the center of each cell to the boundary edge. The resulting displacements provide for an image comparable to my reference but require a shading rate of 0.25 or less to avoid flickering in a moving image. This is a side effect of not having a level of detail high enough to capture the minute polygons produced through the high number of displacements.

- RSL – Pixar RenderMan Studio
- Cutter / Text Editor



Explosion – This is a data visualization piece done for SideFX during my four-month internship in Toronto. As part of a two-man team, I was responsible for project management and the development of visualization techniques for complex volumes and debris simulation. We were given point data scanned from a real explosion. The goal was to visualize the points in the form of an explosion, while simultaneously staying true to the physical accuracy of the points. In this project, I used the trajectory of the points, along with its velocity and rotation attributes to create secondary smoke trails effects, as well as an extensive system for fracturing geometry to produce a number of shards equal to the number of points in the original data. Linear Interpolation equations were used to fracture each part of the truck differently, while still keeping a total amount of fractured pieces. In order to save time, no Houdini solver was used, except for the core smoke which utilized the pyro solver. All of the effects elements in this piece were done separately to achieve a specific look for each, and because of the amount of data to be simulated, the amount of points used was approximately 0.1% of the total points available in the original data.

- SideFX Houdini
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FX - Impact Dust – I had the opportunity to produce a lot of volumetric effects for 'How to Train Your Dragon: Gift of the Night Fury'. Here, I was responsible for the impact dust as well as the impacted pebbles.

- Autodesk Maya
- Proprietary Tools



FX Dev - Camera Flashes Asset - For Madagascar 3 I developed an artistically controllable, completely procedural and scalable system that simulates camera flashes and produces the necessary PBGI data to illuminate nearby crowd geometry. The system was propagated across over 30 shots.

- SideFx Houdini