Real-Time Transformations in The Order: 1886

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Figure 1: *A final real-time transformation sequence from The Order: 1886.*

Abstract

We set out to achieve a standardized way of transforming between two full-body characters of dissimilar proportions. The intention was to share a limited set of rig designs across multiple characters to maximize use and cut down on authoring time. The creation of a full-body rig as opposed to discreet setups per scenario gave us flexibility when developing new scenes, but increased the initial setup time as all features would be required for each rig regardless of their use. Some additional work was required after animations were finalized to simulate cloth and animate materials.

1 Body

Our transformation rigs start off as a full-body rig base off our standardized character setup. We then take another full-body character rig and find the joint offsets between the two. Each translation, rotation, and scale offset is exposed per joint in the new transformation rig. When the joints are able to closely represent both characters we introduce a blendshape to resolve any additional discrepancies. Each blendshape target is masked off to a region specified by the animators. This results in a full transformation of the base character into the target character when all the offsets and targets are turned on.

The non-transformation character rigs in *The Order: 1886* have the head and body separated for workflow purposes. Due to the complexity of the transformation rigs we decided to include the bodies and heads together in one continuous mesh. This means that facial expressions were included with the body. In order to achieve the same facial expression across both rigs we had to include both sets of expressions.

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Layered materials were utilized to create all surface changes over time. Each material had a layer for the initial state, as well as a final transformed state, both linked to separate a UV set. A mask was authored to blend between the two states, using 0-1 values to determine the timing of the animation.

2 Hair

To achieve the appearance of hair growth, all hair cards were arranged horizontally in UV space, and their UVs were offset using a single directional parameter. However, a single offset was not sufficient to achieve a non-uniform growth pattern. As a solution, multiple materials were inherited from a single base, and were applied regionally to the hair, allowing for separate animation parameters. The material used a blend mask to match the growth offset animation, allowing for a much a softer transition.

We found that through the chaotic behavior of transformations the hair acted the most predictably when it followed closely to the body mesh under it. Our pipeline included some custom tools that helped manage all of the hair mesh as well as transferred target weight masks for fast iterations when dealing with unique hair types per character.

3 Clothes

After researching multiple cloth tearing approaches we found that authoring clothes uniquely allowed for the most artistic control since each cloth tear was custom to a shot. This required a unique cloth setup per transformation, but allowed for the cloth to be deformed using all methods at our disposal. We achieved this by simulating and animating pieces of clothes outside of our game engine, then transferring the vertex animation to separate pieces of mesh. We then exported the mesh to game as an animated blendshape.

Our method for simulating cloth wasn't able to create tears that were convincing enough to suggest actual separation of fibers. As a solution, alpha tears were hand-painted and blended on over time using a gradient map that matched the timing of the sequence.