Spies in Disguise: Creating a Gooey Kimura

Cristian Hinz
Blue Sky Studios
cristianhinz@blueskystudios.com

ABSTRACT

This unique character look was inspired by the simulation tests done by the Character Simulation Department, which were so successful, they became the inspiration for the "Kimura" sequence. We will talk about the workflow we used for creating "Gooey Kimura", how we worked together with animation, as well as how simulation was used to guide animation to achieve more fluid motion. We will also discuss the challenges we had to overcome to create an animated, yet dynamic character, which felt natural and maintained the animator's intention while delivering a physical simulation that conveyed the essence of the character.

Figure 1: Final rendered frame

CCS CONCEPTS

• **Computing methodologies → Physical simulation**.

KEYWORDS

simulation, volume, preservation, vellum, tetrahedral, animation, spies in disguise, blue sky

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1 INTRODUCTION

During the production of "Spies in Disguise", the Character Simulation team was tasked with testing ways of simulating large amounts of flesh. These tests were so successful, the directors were inspired to make it into an entire sequence. In this sequence one of the villains, Kimura, turns into goo.

2 CHALLENGES

The main challenge for this sequence was delivering a performance that could hit all the animation poses, while still looking dynamic. At the same time, the simulation needed to be art direct-able to achieve the "look and feel" the directors envisioned.

3 FROM ANIMATION TO SIMULATION AND BACK

To achieve this fine balance between animation and simulation, the Animation and Character Simulation teams had to come up with a workflow that allowed data to flow both ways. Each Animator was paired up with a Character Simulation TD. The Simulation TD would use the animation as a starting point, targeting parts of the body that had to match the animation as close as possible and letting other parts of the body react naturally. Once this pass was done, the simulation data could then be passed back to the animator to use it as a guide for matching the facial animation back to the simulation.

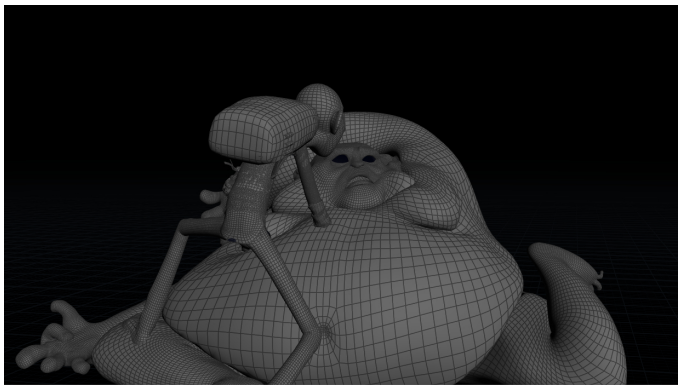

Figure 2: Input animation geometry

In Figure 2 we can see the geometry from animation.

4 VOLUME SIMULATION

One of the biggest challenges the Character Simulation team had to tackle was keeping the shape of Kimura while still being gooey. To achieve this effect we used a mix of techniques, mainly attaching the inside of the tetrahedral mesh to the input animation. To select which areas of the inside mesh would attach, we used volumes and a smoothed offset version of the mesh which we could use to detect points inside of it. These points were the ones we would then attach

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to the animated geometry and that would act as a skeleton to drive the outer layers of the tetrahedral mesh.

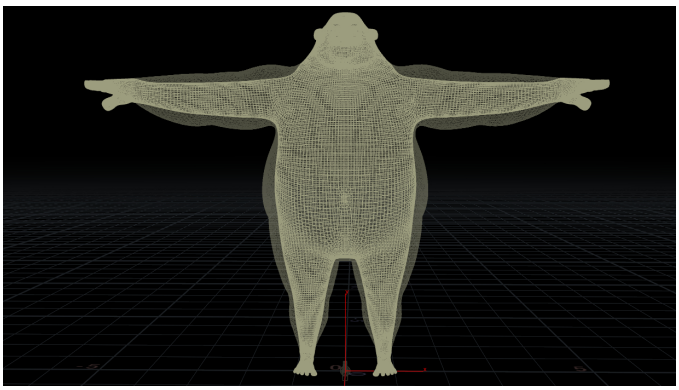

Figure 3: Volume skeleton target

5 INTERACTION

Character interactions were a big part of this sequence. To achieve high fidelity contact we first simulated collisions between the characters and the tetrahedral mesh which would give us a low fidelity result. An additional pass was then simulated to collide the characters with the full resolution skin geometry.

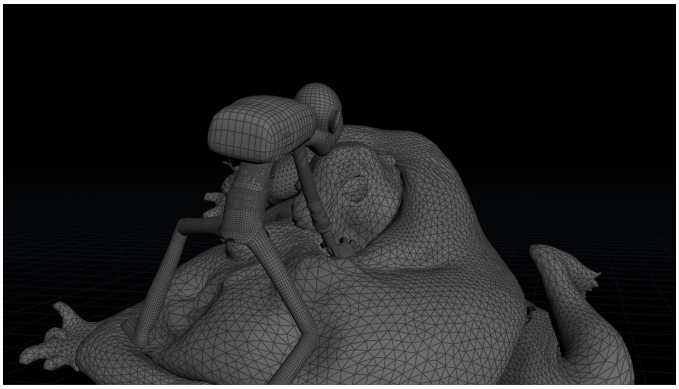

Figure 4: Simulated geometry

In Figure 4 we can see the tetrahedral volume first pass simulated with collisions.

6 SHOT FINISHING

For the finishing pass of the shots, we took the animation and the simulation and combined them. Parts of the body ...like the eyes, mouth and eyebrows were treated as hard anchor points, as well as in some cases the fingers, knuckles, etc. Those anchor areas were blended to the animation geometry and the rest of the geometry was the simulation. We used a number of techniques for cleanup, like smoothing, normal offsets and relative tweaks, which allowed the artists to manipulate the geometry while still maintaining the underlying motion.

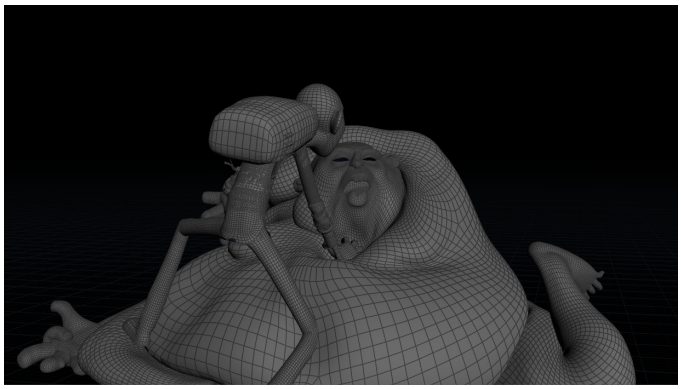

Figure 5: Full resolution mesh

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