

“It’s a UVN Face Rig, Charlie Brown”: Facial Techniques For Peanuts

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Figure 1: Peanuts UVN smiles and character views. © 2015 Twentieth Century Fox Film Corporation. All rights reserved. PEANUTS © Peanuts Worldwide LLC. Not for sale or duplication.

Abstract

The Peanuts Movie presented a fantastic challenge for Blue Sky Studios: bring Charles Schulz’s beloved and iconic characters into a 3D world while remaining faithful to the original comic’s style and design. The characters’ heads and faces posed unique problems that were difficult to solve with our existing technology. From tiny pinched mouths, to ear to ear smiles, their expressions stretched to great extremes without disturbing the clean profiles and smooth shading of their round heads. A new approach was developed to preserve and control the head shapes while allowing facial features to slide freely around those curved volumes. Additionally, Schulz removed 3 dimensional form where it diluted clarity and drew aspects of the character differently when it detracted from simple graphic appeal. Thus, their proportions and facial features change position and shape depending on their viewing angle. Due to the degree of change, a single standard three dimensional model would not suffice. To solve this issue we decided to make rig states which we called character views.

1 UVN Transformation

Initial tests using traditional blend-shape methods revealed surface distortions and volume loss due to linear interpolation between expressions. Therefore, we decided to transform the head mesh vertices into a UVN coordinate space defined by a NURBS surface built into each head. The vertices were mapped to their closest UV coordinates on the surface and their assigned distances became their N coordinates. The flattened, square UVN meshes were presented back in the animation interface to be sculpted and deformed using traditional methods including linear blending. After deformation the meshes were transformed back to Cartesian space by evaluating the NURBS surface at the new UV coordinates. The surface normals were scaled by the new N coordinate and added to the surface positions. Using this method, linear vertex

translations in UVN space became volume preserving curved paths in Cartesian space that could be controlled by the underlying NURBS surfaces. Charlie Brown was our first character and became the prototype for the others. After finding an ideal topology combination for the head mesh and the NURBS surface, new expressions could be sculpted directly in UVN space without changing his head shape. When we began work on Snoopy and Woodstock the number of head and mouth combinations in Schulz’s comic seemed infinite. The UVN transformation proved effective again, but during testing we found that we needed to reshape both the head mesh and the NURBS surface together for certain poses. This method gave us the extreme ranges we needed.

2 Peanuts Factory

Since we did not have the resources or time to build each rig individually, a procedural Peanuts “factory” method was developed. A detailed reference map of facial landmarks was made for Charlie’s face and a corresponding map was made for each kid. By comparing the UVN locations of Charlie’s landmarks to the kid’s landmarks his NURBS surface could be reshaped to precisely fit each kid’s head shape. Once this was complete we could reuse all of Charlie’s carefully sculpted UVN facial expression in the other kids’ rigs.

3 Character Views

Character views were art directed poses, one per viewing angle, driven by the rig and working as a new “on model” starting point for animation. Character views helped us achieve a more accurate translation of Schulz’s art into a 3D model by matching the 2D aesthetic in rig with one art directed attribute. Looking through all of Schulz’s renditions we came to the realization that the characters were only drawn within five different head angles (profile left, sparky left, sparky right, profile right, and head up). We called the ¼ head angle (the most commonly found one) the sparky view after Schulz’s nickname. In order to incorporate these into the rig we created a pose per view by moving the rig components into position and cleaning up the deformations with art directed corrective shapes. A broad head shape change was applied to the underlying UVN driver surface through Cartesian space offsets. More detailed facial feature adjustments were applied to the final deformation surface via UVN space offsets.

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