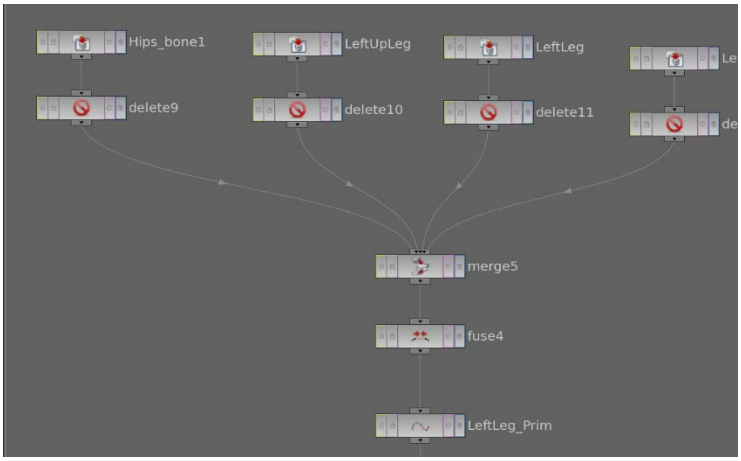
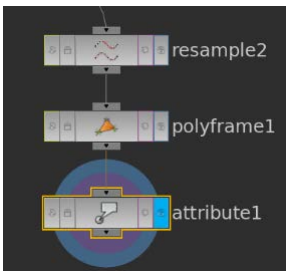
Pyro Man

This effect was created by creating a wire model from a motion capture skeleton, then using the wire to drive both a velocity field to capture and control a pyro simulation. The animation was captured with Vicon Blade in a 12 camera motion capture volume. Initially, the animation was a sword wielder making two lunging strikes followed by a jumping spin into a third attack facing the other direction.

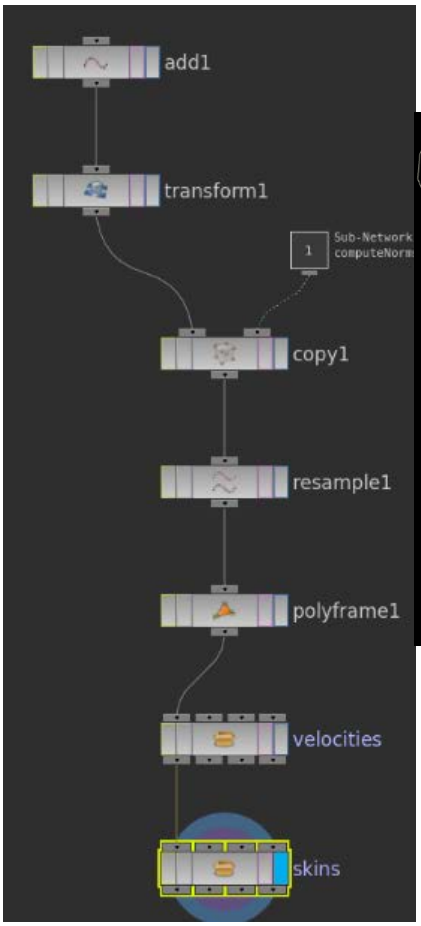


After exporting the mocap from Blade as an FBX file, I was able to import it into Houdini for use animating. To manage the animation, merged the individual bones into a geo SOP and deleted all but the tips from the bones. The merge nodes use an expression that cites the node name to enforce naming pertinent SOPS for scene management. From there, all of the remaining points from each limb are merged. After fusing the coincident points, the line is created using an Add SOP.

After the lines are created they are upresed with a resample set to a subdivision curve, which smooths out the otherwise sharply angled lines from the Add node. Subsequently a Poly Frame node is used to evaluate the vectors that are needed by a Copy node to align gemoetry along the length.

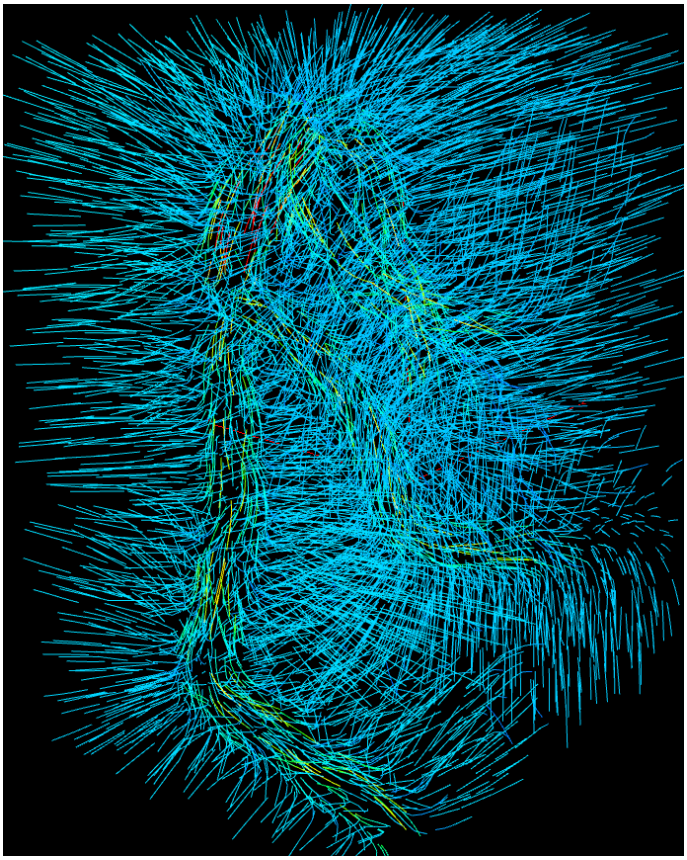


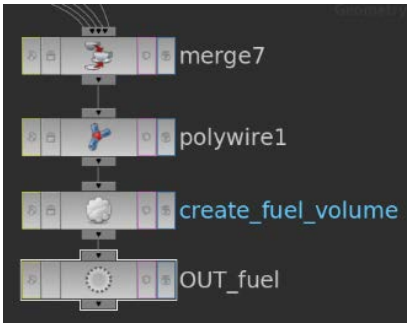
After the attributes are properly renamed for future use, the lines are sent into 2 branches. One branch to generate the controls and another for the source.



In the subnetwork that generates the control structure for the velocity field, an Add node is utilized to create a rectangle of controlable size which is then copied into concentric rings using the Copy node. These rectangles are then smoothed using another Resample node set to Subdivision Curve. Then another Poly Frame node calculates the Normal, Tangent, and Bitangent vectors for all of the points. The Velocities subnetwork consists of 4 attribute wrangle nodes which are all designed to blend the Normal, Tangent, and Bitangent vectors while retaining the unit length. This is accomplished by using a fit expression to create a scale multiplier for each vector who's input ranged between 0 and the sum of all 3 blend values and who's output was normalized between 0 and 1. From here, I was able to add the three vectors together, scaled by their respective factors, to achieve a normalized blending of the 3 vectors to use as a velocity vector for each layer. A checkbox designed to reverse the dirction of the vector in the composition. With these 6 controls and one for an overall scale on each layer, I was able to create a system that allowed for very finite control in a minimal interface.

Using a Volume VOP I was able to apply the velocity vectors to a volume created with bounding and VDB from polygons nodes. This is a visualization created with point trails sourcing off of points generated in the volume with a Points From Volume SOP. This allowed for playback without jittering points like what occur with a Scatter SOP.





The other branch of the system is for generating the source for the pyro. To do this, I polywire the lines generated from the skeleton, then use this geometry to create the volume for my fuel and temperature fields.

The pyro simulation is essentially a regular Smokeless Fire shelf tool, with one key variation. The velocity field is brought into the simulation on its own Source Volume node with Blended Average set for the velocity setting and normalize turned off. The Temperature and Source Volume fields are both set to none. Using a high value for the Target Influence allows for the majority of the velocity field to be calculated from the control structure, while still advecting turbulence and noise in for each frame.