COMPLEX HAIR AND FUR

Hair and fur is complex in any rendering and animation software, not least because the hairs are not objects but lines which are shaded in a particular way. We’ll look at two ways this can be done in Blender.

Bring the Suzanne monkey head into the scene with two subdivisions and apply them to create a fairly dense mesh. Adding a subdivision modifier can be done with the shortcut Control-2.

Smooth the mesh and give it a light brown color with no specular-ity. It’s important that Suzanne have a base material even though we’re adding fur. Call it Skin. Then go to the foot of the 3D window and choose Object – Quick Effects – Quick Fur, then render.

This would work for a rug, but in this case even the monkey’s eyes are furry. We need something more accurate for a character. A way to do this is covered in 024-SimpleHair.pdf, but in this guide we’ll look at a more advanced way to create realistic hair, fur, or grass.
First, we’ll define where the short base fur will be. In Edit mode select the vertices where you want the base fur to be. It’s easiest to select the eyes and mouth then use Control-I to invert the selection. You can select the eyes by selecting a vertex on each one and then using Control-L to select Linked. As the mouth is not a separate mesh, however, it’s better to use Circle select, or weight painting, for that.

When you have the base fur distribution selected create a new vertex group called Base Fur and assign this selection to define it. Check if it worked by using A to deselect all vertices and then click the Select button in Vertex Groups. The same vertices should be selected.

Now if you go back to Object mode and move to the bottom of the Particle tab you’ll see a panel called Vertex Groups. Open this and click on the panel to the right of Density. Your Base Fur vertex group will be there. Click on it and the fur in the preview window will rearrange itself to reflect the location of the vertices in the group.
Now we’ll use a more precise and controllable method for the longer fur. First, hide the base fur by going to the Modifiers tab – not the Particle tab – and clicking on the eye icon so that it turns light gray. The fur will disappear in the 3D window, though if you render the monkey the fur will still show up. Incidentally, you’ll see that the Short Fur particle system hasn’t yet been renamed. It’s a good idea to name particle systems as soon as possible to avoid confusion. Let’s make it something like Base Fur.

Go back to the Vertex Groups in Object Data and make a new group. Call it something like Long Fur. We’re going to do some weight painting and don’t want to change the existing group. With the new group selected in blue, go into Weight Paint mode. Suzanne will begin as all dark blue, which means the vertices have no weighting.

Now paint your selection with the brush on the right fly-in to give this selection soft edges. Blue means no weighting, red means 100%. If you have added too many points change the Blend mode to Subtract and the brush will act as an eraser. Another useful tool in Weight Painting is X Mirror (found in the Options tab in the left flyin).

As you create a weight paint map it is automatically saved as the current Vertex Group; no need to Assign it, and in fact that option is not even available in Weight Paint mode. Weight painting is the same as
selecting vertices, but with the advantage that you can partially select them instead of only having selected-deselected available.

Go back to Object mode, and to the Particle systems tab in Properties. Click the + button to create a new system. Call it Long Fur and choose the type to be Hair.

Suzanne’s head will appear to explode with long strands of wire like hairs. Reduce the length to around 0.25; this will be her long fur. Take the opportunity to rename this particle system Long Fur.

Next, create a new material for the long fur. This will be the third (at least) material for Suzanne as she already has the Skin and Short Fur materials. This new material will be Long Fur.

It doesn’t matter what color you make it as now you’re going to change its Z Transparency Alpha to zero (though the specularity does matter; make it shiny or matt as you like). Having a transparent material means that now all the color and transparency will come from the texture.

Now add a Texture, call it Long Fur, and make that texture type Blend. Change the texture’s Mapping coordinates to Strand/Particle. In the Render panel choose Long Fur as the material.
In the Influence panel at the foot of the Texture tab check Alpha as well as Color (otherwise you won’t see anything except the shadows of the hairs). Then move over to the Particle tab and for the Long Fur system choose Long Fur in the Vertex Groups Density panel. This will use your weight painted selection for the long fur.

When you render you should have something like this.

Suzanne renders with the short fur as before but with long purple hairs as well. Remember this purple is a warning color – Blender is letting you know you haven’t defined a material color. Let’s make the position of these hairs easier to see by thickening them.

Go back to the Material tab and in the Strand panel (just above Options) make the Root 4.00000 and reduce the Tip to 0.25000.

Now render it again.
Reduce the Root value to 2.00000, then return to the Texture tab. Check Show Alpha under the preview window, and you'll see a solid white on the right fade to a checkerboard pattern on the left. Now open the Colors section and check Ramp. You will get the default values of transparent to solid white, matching the preview window above.
You’ve now defined a color, but if you render again you’ll see the long hairs are white at the tip and transparent at the root. The left hand side of the ramp defines the base of the hair and the right the tip. Let’s make the long hairs dark at the root, the same color half way along, fading to white three quarters of the way to the end, and make the end itself fully transparent so that the white fades gradually to nothing.

We’ll need two more stops on the ramp, so click the + button twice.

The selected stop will have a white triangle above it. Drag them to the correct positions and give each the correct color and opacity by adjusting the R, G, B, and A values in the color picker under the ramp. For fully opaque colors the A value should be 1.000. You can copy and paste a color by hovering the cursor over the color picker, hitting Control-C, then moving to the next stop and using Control-V.

Eventually you should have something like the image on the left.

Increasing the length of the long fur to around 0.500 now Suzanne looks something like this:
But the long fur is still a bit sparse. The automatically generated fur looks better, and this is because it comes in with child hairs around each calculated hair. We can see this if we look at the Short Fur particle system values in the Children panel.

Let’s use half these values for the Long Fur – 5 for Display, and 25 for Render. This will speed the render and look more realistic.

Much better. We’re almost done.

Now go to the Field Weights section above and check the box Use for Growing Hair. Instantly all the fur falls straight down. Reduce the effect of gravity in the same section to around 0.004. You will probably need to hold down the Shift key as you drag in the value box to have finer control over the change as it approaches this number.
Hair and fur generally lie in different directions. This can be done in Particle mode, accessible from the Object mode popup whenever a particle system is present on a selected object. The tools available in the left flyin allow you to trim, comb, and adjust the length of the hair across the head. Here I have combed the fur away from Suzanne’s eyes and trimmed it around her eyes, ears, nose, and mouth. I’ve added shiny white and black materials to her eyes by separating out groups of faces from the main mesh and adding new submaterials, and changed the color of the skin and base fur.
The Hair particle system is versatile and can be used not only for hair and fur, but also for spines, grass, and distributing objects such as rocks around a scene.

**Check list for creating long hair (or fur, or grass):**

Make your vertex selections using Edit mode and Vertex Groups, or Weight Paint mode.
Make a material for the fur with zero alpha and specular components
Create a texture for that material and make the type Blend
Change the Mapping coordinates to Strand/Particle; check Alpha as well as Color under Influence
Make a Hair particle system and name it. Adjust the length.
Choose a material for that particle system under the Render panel for the particle system
Adjust the root and tip values in the Strand panel in Material. Choose the Strand preview.
In Texture check Show Alpha, then open Colors and check Ramp
Adjust the Ramp values of color, alpha, and stop positions
In Particles open the Children panel, select Interpolated, and adjust as needed.
In Particles go to the Field Weights section and check Use for Growing Hair. Adjust Gravity.
Go to Particle mode and style the hair.

If you are animating the figure you will also want to activate Hair Dynamics in the Particle System tab

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