Conjuring a Dragon (How to Create a Giant Plushy)

by Farantir

Update: Added Stencils and .blend file
Disclaimer: This is not a Step by Step guide - the process i came up with is highly tailored to my own skill set. You might find other solutions that are way easier for you. I am by no means an expert in any of the topics i will touch and my methods may be sub par and are certainly unconventional. In fact, i have never created a Plushy before.

I created this Instructable because the documentation i could find about the Topic is rather sparse. Maybe i am blind, or maybe there really aren't that many people out there, creating there own giant stuffed animals.

I hope i can give you insight and help you on your own journey by describing what i came up with, what worked well - and what didn't

Supplies:

Determination.

Get a big bucked. You better not run out

I will touch upon materials later. They can only be ordered after the design is finalized

You will need the following tools, in the following order:

Design & Stencil creation:

- Printer
- Paper (i needed ~130 pages)
- Tape
- (Paper) Scissors

Fabric Processing:

- (Fabric) Marker
- Calipers (or any other tool for drawing a 1cm boarder)
- (Fabric) Scissors
- Fixing Pins
- Sewing machine (if you want to keep your sanity)
- hand sewing needle (for tight spaces)

Step 1: Design Phase

This section requires basic knowlage of 3d modeling software.

The design of the stencils is the most critical and probably the most difficult part.

I don't know how a Plushy stencil is usually created, but i came up with a rather simple solution.

In 3d modeling a process called UV unvrapping is used to project the "skin" of a 3d model onto a two dimensional plane. This relation can then be used to apply textures and materials to the model.

The Process can best be described as unfolding the model, like peeling the Skin of an Orange and laying it flat onto the ground.

While every watertight 3d model could be unvrapped to create the skin for a plushy, it is important to realize, that a plushy will deform due to the internal pressure of the stuffing. This means that everything will get "round" and outward facing. If you where to create a plush moon, all its craters would become hills once stuffed.

A good example for this is the head of the dragon. Compare the 3d model used to create the stencils to the finished stuffed head (see pictures)

I used blender to create a model of a plushy i was happy with. I ended up downloading and using two different models i quite heavily modified. One for the body and one for the head. Do what works best for you here.

When you are happy with your creation its time to mark the edges as seams used for UV unwrapping. These will be.. well.. the seams of your plushy. Before UV unwrapping make sure you applied all transforms, to ensure all parts of your model will be unwrapped to a uniform size. If you want to save a lot of work and Printing paper, you can create your model by using a mirror modifier (highly recommended). The resulting UV map will be exactly halve of your model.

After unwrapping your model, you can inspect the UV map. Try to eliminate as much tension as possible by adding more seams where needed (blender can visualize the tension as a colored overlay for you).

This is also the time where you need to decide about color. Each change in color will require a change in fabric.. each change in fabric will require a seam. The actual colors are not important yet, but you need to make sure, that each colored patch is separated by seams from different colored fabric. This also applies if you have parts with a different kind of fabric (e.g. parts with long fur)

It is also at this Stage, that you need to decide if you want to be able to wash your Creation. I wanted too - and this created a lot of extra Work, so be warned.

The Plan is to create your Plushy twofold. One large Outer skin with small decorations and fiddly parts on it (horns, paws.. you get it) and separate inner chambers that will be stuffed. The stuffed inner parts will be hold together by Velcro. This reduces the stress on the outer skin, since shear forces are mostly transferred to the inner, none elastic parts. (see the Pictures for reference)

Creating the chambers in your design however is super easy. Simply decide where you want them and insert a face as a division. make sure the face has proper seams and you are done. Note however, that you will need a way to get the stuffed parts in and out of your "skin". I Decided to use a seam at the belly to sew a zipper in.

I didn't create a separate chamber for the head and i did regret it. The stuffing i used appears to degenerate a bit while being washed

When you feel happy about your creation, export the UV map as an Image and use a tool to upscale it to a desired size. I used https://rasterbator.net/ for that purpose.

Start with a small version. Large enough to create a small prototype out of paper. If you notice any flaws in your design, its back to the drawing board. Remember that paper behaves different than stuffed fabric tho. Its a lot stiffer and resembles more the original 3d model, than the stuffed version.

If everything works out, its time to create the paper template. Scale the picture up to your desired Plushy size. If your Plushy needs parts from several 3d models (like mine did) you can match their sizes with a simple trick:

1. Print your Main model in the desired scale
2. print your second model (the one you want to match) in any scale. Note down that scale.
3. find a known relation on booth parts. If they have a e.g. a common surface, measure the width of the surface on the printout of your first model. Measure the same part on the printout of you second model
4. use the following formula to find the scale of your 2. model:
5. desired_scale = current_scale * (measurement_model1/measurement_model2)

Once you are ready and have printed out all your parts, you can tape the pieces of paper together and cut out the Pattern out.

Congratulations. You now have a cutting template.

You should keep your 3d model. You may - or quite certainly will - need its UV Editor as a reference to assemble all the fabric pieces later on

Select
Add
Mesh
Vertex
Edge
Face
UV

Step 2: Ordering the Materials

There are various Supplies to get and i will touch upon Each of them:

Velcro: get lots if you choose to make your Plushy washable, get little if you don't

Superglue: Will be needed to glue the velcro on the Back of the eyes

Eyes: i ordered mine from Etsy (https://www.etsy.com/listing/633685771) the 50mm Pair Variant

Stuffing: i ordered 3kg of this stuff (https://www.amazon.de/gp/product/B07RV42614/) but used only about 2kg.

Weight: If you want some parts to be heavier (e.g. the paws for better hugs) get some plastic pellets. I ordered 2kg of those (https://www.amazon.de/gp/product/B0754K813K/) and still got plenty left.

And now onto the difficult part: **Fabric**.

Before we begin, you need to decide for a fabric type. Choose something none stretchable for the inner Parts, probably some old woven cotton stuff you may still have lying around. (if you decided to go the washable route) and something slightly stretchable for the skin.

I used a German page somewhere describing the different fabrics used for stuffed animals, but i am unable to find it again so i can only talk about my selection.

I chose cotton Terrycloth (the stuff towels are made out of) since i wanted something that wouldn't be skin irritating in any way and easily washable and breathing. It sews really well, tho undoing a seam is nearly impossible.

Here is a list of drawbacks:

1. its rather expensive
2. its rather heavy (this is preference)
3. its not as fluffy as most other solutions
4. undoing a seam is nearly impossible

that said, it still was the right choice for me.

If you are unsure about color choices, you can use your 3d model as reference. Since its UV unwrapped (how convenient) take a picture of each fabric and apply it as a material on each of the different colored patches you prepared earlier (see pictures).

If you have decided for all the fabrics you want to use, you can proceed to determine their quantities.

If you unwrapped using the mirror modifier remember: you only have halve of the Pattern! Each Piece must be counted twice for the fabric area - with its front and its backside

the Process is the same for each fabric type:

1. use tape to mark a rectangle on your floor - As high as your fabric and as width as you wish. I chose 1m for convenience
2. start placing as many parts of the pattern that belong to this type of fabric into the rectangle
3. ensure at least a 2cm gap between different parts (seam allowance! see pictures)
4. when the rectangle is filled, count it, clean it up and place the rest of the pattern pieces
5. when no pieces are left uncounted note the number of rectangles you needed and add a safety margin (this will be the length of the needed fabric)

Once you measured the needed length of all your fabrics, go ahead and place an order. you are now done with this step

UV Editing
Texture Paint
Shading
Animation
Rendering
Compositing
Scripting
Scene
Global
Options
View
Select
Add
Object
body002
View
Select
Add
Node
Use Nodes
Slot 1
Material
mask2
mask1
Mix
Mix
Subsurface Radius
Subsurface Color
Metallic 0.000
Specular 0.500
Specular Tint 0.000
Roughness 0.891
Anisotropic 0.000
Anisotropic Rotation 0.000
Sheen 0.000
Sheen Tint 0.482
Clearcoat 0.000
Clearcoat Roughness 0.030
IOR 1.450
Transmission 0.000

Step 3: Sewing

Choose the Part you want to start with - if you decided to make the Plushy washable, choose one of the inner parts - select all the pieces of the pattern required for the part and transfer them onto your fabric. Make sure to transfer them onto the side of the fabric, that will be inward facing. Use a fabric marker for this. Other Markers may bleed through the fabric when washing.

Once done, mark the seam allowance (a 1cm border around each pattern piece). Now cut every piece out along the seam allowance. (see Pictures for reference)

Use fixing pins to hold two pieces of fabric together, so that the lines marking the seam overlap and the "pretty" side of the fabric is faced Inwards. You can use the 3d model as a reference. Double check everything, then start sewing.

If you are sewing the stretchable outer fabric, be sure to use elastic stitchesi Missed this on my first few seams and i fear they will fail some day.

its best to start with the simpler parts and progress as you gain experience. What to sew when exactly depends on your Plush design. But its better to think about it to much than to little. If you decided to wash the Plushy, sew the velcro on your fabric first - then proceed to stitch it together. I decided to use Velcro after i had sewn all the inner parts, so i needed to apply it by hand. It was a tedious and boring task (and i stung myself a lot).

Once sewn, Stuff it. Don't sew everything shut just yet. You may need to make some adjustments. Test fit everything from time to time. I planned Initially for the large body stuffing to be made out of two pieces, but this messed up the design (they booth became cylinders essentially) so i hastily sew them together. This did the trick.

you may also want to experiment with the amount of stuffing you use. If you weight some parts down (e.g. the paws), be sure to reevaluate the stuffing of the arms and legs. You might add some more.

If you didn't make your creation washable, you don't have separate chambers and therefore not the freedom to choose stiffness for all body parts individually.

Once happy with everything, sew it shut. (well, you might want to add Eyes first)

Step 4: The Eyes

This step requires some Eyeballing (da dum tish)

I made a beautiful explosion chart to show what worked for me in the End. You will have to adapt this process to fit your creation.

The eye itself was fitted with Velcro on the backside (the part with the little hooks). I used Cyanoacrylate (Superglue) to attach the Velcro to the Eyes and so far they are holding up fine.

The part the Eye is mounted too was to weak when using only stretchable fabric (it would wiggle around a lot and look all weird and off). So i added a second layer of woven tough fabric behind it. This mostly does the trick. It would be better still, if i had any kind of stiff larger support, but right now i am happy with how it turned out.

If you want to control the eye positioning better, you may sew the Velcro on last - after everything is sewn into the head.

The Eyelids are made out of a rectangle of stretchable fabric. you may experiment with width and length - tho it is not super important. You can always cut down on width by simply not pushing the Eyelid as far outwards before sewing and any excess of length will simply end up at the inside of the head. Just make sure the eyelids are not to short or to small. Use fixing pins to secure the whole stack in place and experiment until you are really happy with it.

Step 5: Decoration

I did not include any horns or claws in my design, since the shape is so easy, the pattern is quickly created by hand.

to create a Horn or Claw, go to your nearly finished Plushy and measure the width that the Horn/Claw should have.

Now calculate the with of the paper stencil. It will be halve the circumference of a circle. If you hate Math, Here is the Formula you need: PI*(measurement/2).

Use this measurement as the height of your part when sketching (see Picture for reference). Cut out your creation, duplicate it and tape booth parts together. You now have a paper mockup of you horn/claw. Go over to your Plushy and test fit. Use a pair of scissors to create a more fitting shape if necessary and the pattern should be ready.

Create the part out of fabric, stuff it and then apply it to you Plushy (this needs to be hand sewn)

π·(hw/2)

Step 6: TPU & Closing Words

Initially i planned on 3d printing the shape of the head in TPU so i could sew fabric onto it later on. This doesn't work - at least it didn't for me. My printer failed Printing large quantities of TPU at once - but the main problem was, that the TPU started to sag and deform after some time (i printed without infill). I didn't really get to the sewing step, so i can't really quote on the sew-ability of TPU and the performance of the fabric-TPU composite.

If you made it this far and really want to tackle a Project like this, i would be happy to see your creation.

If you notice any problems, uncertainties or pitfalls in this instructable, or you hit a roadblock on your journey, feel free to contact me.

Step 7: Resources

If you want to print and sew this yourself, print the Pattern, glue all the pieces together (the order is marked at the bottom of the pages) and cut them out.

As i did not intent to share the pattern at first, its not polished and There are many stumbling blocks. Ill try may best to lay everything out. If you encounter any road blocks feel free to contact me.

You wont need the Eye Pattern (The Eyes are created as described in the Eye section).

If you don't plan to make the Plushy washable

- you wont need any of the Pattern Pieces used to cut the internals into sections.
- start by sewing the neck. Its the simplest part
- You will need every Pattern twice. Remember to include that into your fabric calculations. One time face up, one time face down

If you want to make the Plushy washable

- ignore the large Pattern separating the main body pillow into two separate parts. It needs to be sewn as one large part.
- The leg Pillows don't have a closing face at the bottom of the leg. I did cut that Pattern freehand - Its a just circle. You can do this as one of the last steps
- Start by Sewing the internals. The fabric is easier to work with than terry cloth and if you mess something up, it will be invisible. Since the internal will cover most of the pattern pieces, you will be familiar with them, once you start sewing the outer skin
- don't sew the internals shut until you have completed the Outer skin and test fit everything. You might want to adjust the stuffing of the differren't body parts
- Remember to sew a zipper along the belly of the dragon, to get the internals in and out. i sewed mine in from the tail seam up until the neck seam, so it covers the whole main body. make sure to overlap the fabric, so the zipper is hidden
- For the outer skin: all relevant Pattern pieces will be needed twice, once right side up, once filpped
- For the internals: all relevant Pattern pieces will be needed twice, once right side up, once filpped. Most Pattern Pieces will therefore be needed four times in total (2x outer, 2x inner)

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Oh damn, didn't realize there was one ^^

I wish you the best of Luck :)
Feel free to contact me, if you get stuck.
And i would be happy if you could share a Picture of your creation when you are done ^^

Thanks :)
The body was a model of her, but i did cut the head/neck and the tail off and redid those. Iam not skilled enough to model a dragon from scratch, so i stitched something together. The resamblence is more by chance than on purpouse ^^ i intended to make her green initially, but the green fabric kinda sucked :'D

That's really impressive :)

Thanks :)