So, You Want To Build a (Hundred) Jawa Mask(s)

(note: Off-world updates added at the end. -April 2020)

This is designed to document the basic materials and procedures that the Great Jawa Build used to create 130+ Jawa masks. You may find it useful for building a single mask, but generally we have favored materials and approaches that were practical for producing a large number of masks with a limited budget. Even if you are just building a single mask you'll likely find that some items can only be had in larger amounts than you need. So, think about getting a bunch of friends together and building Jawas for everyone. Jawas are happier in a clan anyway.

Our goals for the masks were:

- Look good
- Should include fans (so our Jawas don't die)
- Use rechargeable batteries
- Accommodate eyeglasses if possible
- Be durable and troopable while staying inexpensive

MATERIALS

I'll describe what we actually used here, including pictures and links to products where possible and some of the tradeoffs.

For the base upon which to construct the masks, we used a cheap black hockey-style costume mask. These are widely available, but the best source we found was Oriental Trading:

http://www.orientaltrading.com/black-hockey-mask-a2-13635698.fltr?keyword=black+hockey+mask

Be sure you get something reasonably substantial. We paid about $3/mask for these. They have another version that are much cheaper by the dozen, but made of very thin plastic that probably wouldn't last through the build process. If necessary, order a few first to make sure you're getting reasonable stuff before ordering bulk. For these masks, consider ordering 20% extra to allow for breakage. When we get to the description of what you're going to do to them, you'll see why (we broke a lot early on). (Requires 1+ per jawa.)

Eye LEDs. While yellow/orange LEDs are available lots of places, they vary widely in quality, brightness and color and you really have to order them to see what you get. The ones I liked best were far from the cheapest, but they were nice and bright. The supplier is AdaFruit, their "Diffused Yellow 10mm LED (25 pack)" at $10. Current link is:

https://www.adafruit.com/product/3260?gclid=Cj0KCQiA4bzSBRDOARIsAHJ1UO4IciBCGmSEeBdxHmyhaBFLkeSODVZum_UFzGIwqHVbcYI0CMCSXN8aAptvEALw_wcB

Each Jawa needs two eyes, so a 25-pack will do for 12.5 Jawas. (This is not a place to skimp. The whole point of a jawa mask is the eyes, so they have to look good.)

Eye caps. The LEDs alone are insufficiently large to meet the Jawa CRL, so one standard solution is to use vending machine balls as eye covers. Each half ball should be hand-sanded inside and out to make it translucent (rather than transparent). This is a somewhat arduous process, but we found no easier ways that looked as good. And again, the eyes are the point, so take your time. These are easily available on Amazon:

https://www.amazon.com/gp/product/B06XCMB8BQ/ref=oh_aui_search_detailpage?ie=UTF8&psc=1

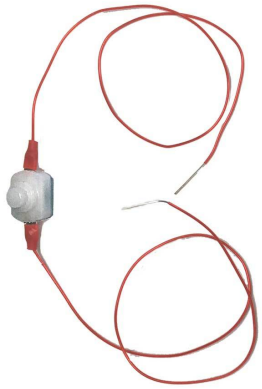
That's 50 for $15, and each half makes a single eye, so one package is good for 50 Jawas.

Fans, batteries and switches: We opted for a 5 volt system so that we could use plentiful USB-style phone booster batteries. For 5V fans, we used these from Amazon, "Vktech 5Pcs Black Brushless DC Cooling Blower Fan 5015S 5V 0.1-0.3A 50x15mm". There's nothing particularly magic about them, but if you want to mount fans inside the masks, the "blower" style (as opposed to "axial" is best. These were cheap, and while we had a few bad fans, they were mostly good quality. We paid about $2/fan in 5-packs.

https://www.amazon.com/gp/product/B00EL938E6/ref=ox_sc_act_title_1?smid=A2SQT4A3AOAPFW&psc=1

For batteries, we used “Anker PowerCore 5000, Ultra-Compact 5000mAh External Battery”, available on Amazon for $20. The technology is changing pretty rapidly, so while what we used was a great in 2018, you might want to re-evaluate if you’re reading this sometime farther in the future. For us, the important characteristic was high capacity in a compact form factor (without sharp edges). Also, this battery came with a USB cable (which we cut up for the mask power cord), and it came with a nice mesh carrying case (at right in that figure). We used that carrying case as a battery holder, securing it to the elastic strap on the mask so that the battery hangs behind the wearer’s head. The padded carrying case makes that perfectly comfortable and if you go with another battery, you would need a different solution.

For switches, there are a lot of cheap options, but we went with a relatively expensive one from an unconventional source and did not regret it. In particular, we found this microswitch from ModelTrainSoftware.com: https://www.modeltrainsoftware.com/products/microswitch They run $2/each, but they already have nice thin leads attached and can surface mount nicely on the jawa masks. We put them in the center of the forehead, mounted on the back but facing out through a hole in the mask. This protects them from accidental activation in your costume tote, but still allows easy on-off action when you’re ready to troop.



The items above: masks, LEDs, eye caps, fans, batteries and switches are the largest easily countable items you need. But you’ll also need to pick up additional wire, black tape, solder, heat shrink tubing, hot glue (in abundance), extra elastic and whatever tools you’ll need. For wire, we used the Kynar Hookup Wire also from ModelTrainSoftare.com, which matched what is on the switches. (https://www.modeltrainsoftware.com/collections/wire-switch-more/products/kynar-hook-up-wire). You’ll need about 5 inches per lead per eye, so that’s about 2 foot per jawa (half black and half red if you want to keep your sanity). You’ll use black tape for a number of things, including securing the wires on the back of the mask, securing the fabric covering, etc. We used black gaffers tape, but had to seek out a “high tack” version because normal gaffers tape is designed to come off relatively easily and that’s not what you want. The best stuff is “Polyken 510/BLK225 510 Premium Grade Gaffers Tape”, found on Amazon for $15 for a 75’ roll of 2” tape. We went through a number of those rolls, so maybe a foot per Jawa? Black zip ties in the 4” length are also necessary. You’ll need maybe 10 per jawa, but you can get them by the thousand on Amazon. You’ll also need some fabric to cover the masks. It needs to be sheer enough that you can see through it (because it is what will obscure your eyes), but not completely translucent. You’ll need roughly a 12”x18” piece per mask. Lastly, you’ll need some kind of padding to keep the fans and chin area from abusing your skin. We ended up using Jaybird & Mais 31-507214 30/31 Adhesive Foam: 1/4" thick,

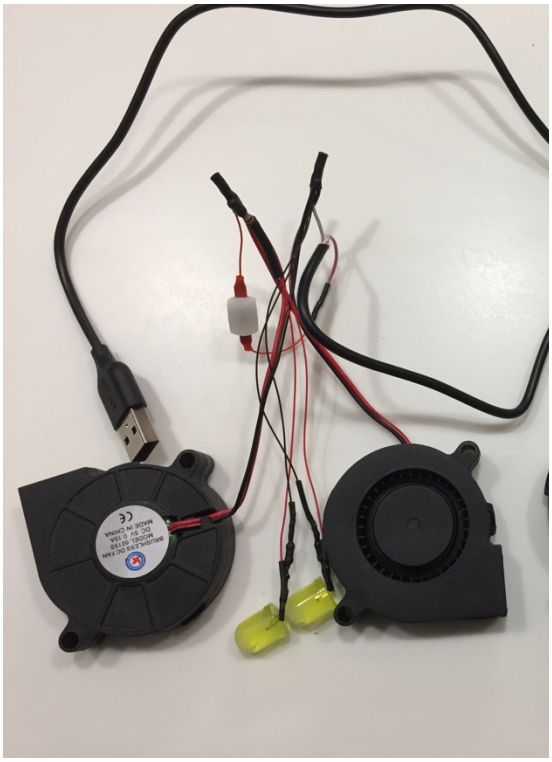
available from Amazon at $15 for a 5’”x6’ roll. Each Jawa only takes an inch or so, so that’s enough for 70 Jawas. (Maybe you can find a better solution for smaller numbers.)
https://www.amazon.com/gp/product/B000VQFSU0/ref=oh_aui_detailpage_o06_s01?ie=UTF8&psc=1

PREPARATION

I'm going to split the mask build process into "Preparation" which includes separate electronics build and physical modifications to the mask, and "Assembly" where we put them all together.

Electronics build

The goal here is to create complete electronics assemblies like the one at the right for each Jawa. We did this in a number of self-contained steps that can be pipelined in an assembly-line manner. Those steps are:



1. On each fan, cut off the connector on the ends of the power wires, strip the insulation off the ends of those wires in preparation for future steps. We found that leaving 4" leads on the fans was good.
2. For each USB cable (the ones that came with the batteries), cut off the micro-USB end, remove at least an inch of external insulation and expose the internal wires. Identify the data and power wires, cut the data wires off and strip the ends of the power wires.[1]
3. Cut and strip the ends of the leads on each push-button switch. Those switches come with nice long leads, but you only need a couple of inches on each end of the switch.
4. Cut and strip the ends of power wires to run to the LEDs. You'll need two red and two black per jawa (one per eye), each about 5" long. (You may be able to re-use the wires you just cut off the push-button switches for the red leads.)
5. Start soldering: For each LED, solder a current-limiting resistor onto one pin of the LED. It doesn't really matter which one, but BE CONSISTENT. We always put the resistor on the cathode, which is the negative side of the LED and the short pin.[2] Test every LED using a button-cell battery to make sure you got the polarity right. (Better to find out now if you didn't.)
6. For each of the prepared USB cables, solder a switch to the positive power wire (the red wire for our cables). Protect that connection with heat-shrink tubing.

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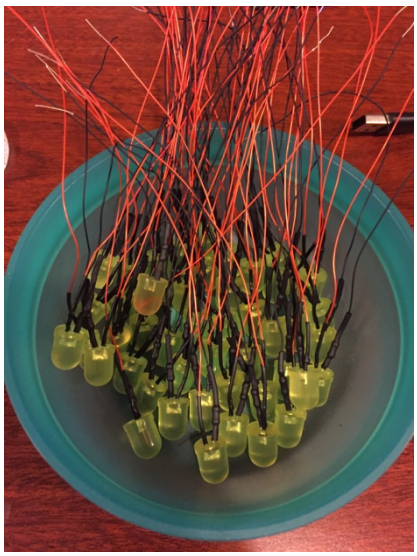
[1] You can identify the wires by plugging the cable into a charged battery and then using a volt-ohm meter to find which is positive power (red in our cables) and which is negative power (gray in our cables). The other two wires are for data (white and green in our cables) and will not be used in this project.

[2] The resistance value of the current limiting resistor can easily be determined by googling "LED calculator" and finding a web-based tool (like this one: http://led.linear1.org/1led.wiz). Plug in your supply voltage (5V), the current you want (usually 20mA) and the forward voltage (2.2V for us). This gave us a resistance value of 150 Ohms. Resistors can be found in bulk on Amazon for roughly 2 cents each in packages of 500. You'll pay more if you get them singly.)

7. For each of the LEDs with installed resistors, add the 5" leads. If you put the resistor on the short pin in step 5 above, then the black wire goes on the other end of the resistor and the red wire goes on the LED pin without a resistor. When you are done, use heat-shrink tubing to protect and insulate all the LED connections (both sides of the resistor and the LED/lead connection). Again, test every LED using a button-cell battery before you put it aside as complete. Far better to identify polarity or other problems now. (Bowl of prepared LEDs at right.)



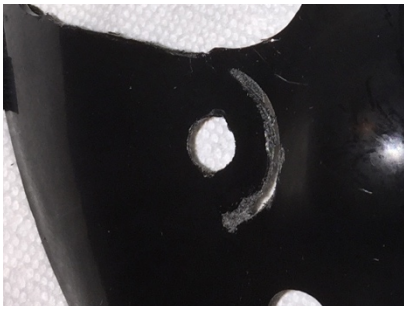
8. Final electrical connection. Solder together the red wires of two fans, two LEDs and one switch/cable assembly. Then solder together the black wires of all the parts (gray in the case of the cable assembly) and protect each of these connections with heat shrink tubing. Plug the assembly into a charged battery and ensure that each fan is running and each LED is glowing with the same brightness. Vastly easier to fix problems at this stage, before everything is mounted on a mask.
9. As a final step, we found that the AdaFruit LEDs, while quite bright, tend to "project" light forward rather than glowing uniformly. This can result in a round bright spot on your Jawa's eyes (maybe off-center, depending upon LED orientation) rather than a uniform glow of the eye caps. To fix this, use a Dremel with a sanding bit to rough-up the top surface of the LEDs. This will scatter the light better and give you better looking eyes.

Final notes: For proper operation, don't skip the resistors, and don't try to get by with one resistor for the entire mask rather than one per LED. If you skip the resistors you'll possibly burn out the LEDs and may suck your battery dry faster than necessary. If you try to use just a single resistor your LEDs may light unevenly. (I wouldn't tell you not to do it if I hadn't seen it done with bad results.) We found that with these fans and LEDs, a fully charged 5000 mAh battery will last about 6 hours. Your mileage may vary.

Mask Physical Preparation

This set of tasks is a lot messier than the electronics build. Basically it involves all the physical modifications to the mask to make it ready for mounting the electronics. This is drill and Dremel work mostly. The goal is a mask that looks like the one on the right. As compared to the original (shown in the materials list), this mask has several extra holes/cuts.

1. A single smallish hole in the middle top of the forehead for mounting the on-off switch.
2. Two 1” holes on either side of the forehead. These will be air intakes for the fans (which will be mounted inside the mask in such a way that they pull air from the outside, through the covering fabric).
3. Significantly expanded eye holes, both to (hopefully) accommodate eyeglasses, and to improve the peripheral vision of the wearer. We created these by starting with new 1” holes near the temples and then using a Dremel to remove the material between these temple holes and the original eye holes.
4. Two holes on either side of the nose, which are used for mounting the LEDs (the hole side should match the LED diameter).
5. A single new slot in the top above the switch hole. This will be used to attach an over-the-head elastic strap.
6. Two crescent-shaped cuts centered on the LED holes, for mounting the eye covers. These cuts are shown in close-up on the right. We’ll talk about these in more detail later.



If you're going to do a bunch of these masks and want to ensure as much consistency as you can, the first step is to make a drilling template. We prepared a hockey mask with small 1/8" pilot holes where each of the larger holes would later be centered. Then we marked those holes with lines on masking tape (for visibility as shown at the right, with the marks on the inside of the mask). Then you can create these guide holes in a new mask by placing the template on the inside of the new mask and carefully drilling through the guide holes. Make sure that you tuck the elastic in both masks safely out of the way during this process. Note that we drilled 7 guide holes per mask, for the switch (1), fans (2), eye expansions (2) and LED mounts (2). (Crescent cuts discussed later.)

The next step is to drill the 1" holes that will be used for fan mounting and eye hole expansion. I'm not sure if there's a better way to do this, but we did it with a 1" wood hole bit mounted in a drill press. Clamp a block of wood onto the drill press table and drill into the inside (concave side) of the mask. For each hole, try to let the mask sit as flat as possible on the press and apply a slow even pressure while maintaining a good grip on the mask. As the bit starts to cut through the final bit of plastic, it will tend to catch and try to pull the mask out of your hands. This is less likely to happen the slower you go, but it will probably happen at some point regardless. If there cut is too much deeper on one side than on the other when one side breaks through the force of you holding the mask back is probably going to break the mask. After a while, you'll probably get pretty good at this and get it right 19 times out of 20. But with 4 holes required per mask that still translates to a 20% breakage rate, so plan ahead and buy extra. (The holes won't be clean, but we'll deburr later.)

After the big holes are done, the smaller holes are easily done with a hand drill, and are far less likely to break the mask if you're careful. Just match the bit size to the LED body diameter (for the LED holes) or to the size of the ring around the pushbutton switch (for the switch hole). If you're having trouble with breakage, first drill the holes out about half the size you need and then use the final-size bit so that you're not trying to make the entire hole in one shot.

Then we get to the Dremel work, for which we used a circular diamond bit. First, so that you don't forget, cut the slot at the top of the mask for the over-the-head elastic. Use the existing slots by the ears as models for slot length, width and distance from the edge. Second, cut from

the top of the temple hole to the top of the eye hole on that side, and then from the bottom of the temple hole to the bottom of the eye hole. Repeat for the other side. Your result should be a wide oval hole that will be large enough that the edge of the Jawa's glasses might stick through (if the glasses aren't too large).

Finally, we come to the crescent-shaped cuts. These are the toughest to create. The idea behind them is that they are used to mount the eye covers, as shown at the right. You want the eyes to appear that they're looking straight ahead, but we have to mount them on the surface of the mask which is sloping away. We tried cutting the eye covers at an angle and gluing them to the mask surface, but glue doesn't stick well to the masks and the eyes tended to fall off. But if you can create a crescent-shaped cut in the mask body, the eye covers can slip down inside, hot glue can find purchase and the result stays together well. The problem is making those cuts.

You can try to make them with the same 1" wood-cutting bit that was recommended for the larger holes. I found that with practice I could make a good cut 3 out of 4 times. Unfortunately failed attempts tended to end up cracking the mask, and with two cuts required per mask only about 50% of the masks survive, not a good ratio. The best solution I found was to use a 1" tile-cutting bit to abrade the crescent cuts. I mounted the bit in the drill press and held the masks against the bit until the appropriate depth was reached. (Not a standard way to use the drill press, but safe at low speeds with a bit that is more abrasive than cutty.) Later in the build process, I created an improvement over a simple tile-cutting bit. The picture at left shows a dowel mounted in the middle of the tile bit. The dowel gets inserted into the LED hole on the mask, which helps keep the bit centered

where you want it to be. (Again, you probably won't do this for making a single mask but if you're doing 100 it's a different story.)

Once all these cuts have been made, you'll need to clean up and deburr the edges of all these holes. Don't forget the switch hole as burrs there can make it hard to activate the switch.

Finally, having made all the physical holes in the masks to prepare for the assembly phase, this is a good time to add/repair elastic. The masks come with an elastic strap that runs from ear to ear. On some masks, that strap may not be well sewn, and an in any case you may have damaged it with all the drilling and dremeling. Examine each mask and repair that elastic as necessary. You'll also want to add an over-the-head elastic strap. We'll be hanging the battery from the ear-to-ear strap, and it will need something to keep that weight from pulling it down. We found that a 12" piece of elastic works well (your Jawa's head sizes might be larger or smaller). Run one end through the slot you cut in the top of the masks and sew it to attach.

ASSEMBLY

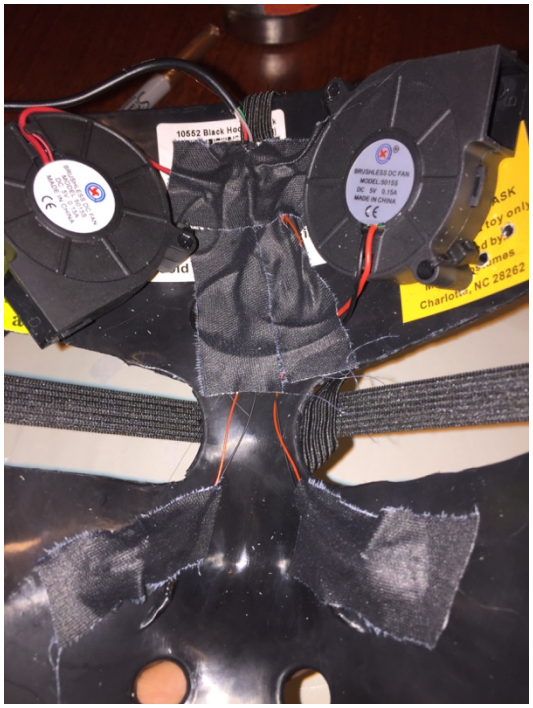
Now you have two sets of things, functioning and tested electric assemblies with fans and LEDS, and masks which have a lot of new holes, have been deburred and had some elastic added. We're ready to put those things together and produce our final masks. But before we start, double-check that 1) you've added the extra over-the-head elastic piece to each mask, and 2) you've thoroughly roughed-up the surface of every LED. Also, make sure you tuck that elastic out of the way, around the front of the mask might be best.

1) We're going to start the assembly by attaching the fans to the mask bodies with zip ties. The fans get attached to the inside of the mask bodies over the 1" holes we made for the to draw air through. You want the fans to blow to the side of the mask (not down over the wearer's eyes, because that would get annoying fast). The fans don't come in left and right models, so for them to both blow to the side, they'll just be rotated roughly 180 degrees from each other, as shown at right. Each fan has two mounting holes and we want a zip tie in each. The zip tie has to go through the mask and then come back in to close the loop, so we need two holes per zip tie, two zip ties per fan and two fans per mask, so 8 holes total. In order to drill these in the right spot, we used a broken bit of fan, held in in the right spot based on how we wanted the fan to be oriented, drill one hole in the mounting hole and another nearby for the zip tie to come back through. Example pic at

right showing the two holes for the lower corner of the right side fan. (There's bits of elastic nearby, tucked to the front of the mask. Don't drill it!) If you can't position the fan exactly over the 1" hole for some reason, don't worry overmuch. "Mostly over" is good enough. Position the zip ties so that the "bump" is on the inside, tighten and clip the ends. The pic above showing the orientation is how things should look at the end of this stage, except that it still shows the untrimmed zip ties.

2) After the fans have been attached, the next step is to attach the LEDs. We drilled holes for these next to the nose that should be about the right size, but you might need to adjust those holes with a rat-tail file. You want to make sure that the LEDs face forward, not just straight out from the surface of the mask (which will point to the side a bit). Once you've got the holes to where the LEDs will sit properly, hold them into place with a little bit of hot glue. A touch on the inside and on the outside should be sufficient. These will get the vending-ball eye caps over the tops of them in front and some tape in back, so they won't be subject to much in the way of force. The two pics below show the front and back side after LED installation.

3) Once the LEDs have been installed, it's time to attach the switch. The switch gets mounted to the inside of the forehead (button part facing out!) in the pre-drilled hole. Generally I put a small drop of E-6000 glue on each side of the switch to hold it to the mask in the longer term, and cover it with a strip of gaffers tape to hold it until that glue dries. Try not to put tape on the over-head elastic which is attached nearby, and DON'T GET GLUE ON THE BUTTON! Pic below shows how the switch looks from the inside after being taped down.



4) At this point, the next step is to use gaffer's tape to secure *all* the wires to the back side of the mask. The goal is to just get everything so that it's neat-looking and not flopping around, something like the 2nd pic above. There are two things to note here. First, be sure to cover the entire back side of the LED, because these will glow and you don't want to see your glowing cheeks. Second, there are a couple of existing holes in the mask between the fan holes and you're likely to put take over them when securing the wires on the back side. You don't want sticky tape exposed through those holes on the front side of the mask, so flip it over and put a strip of gaffers tape over those holes to cover it.
5) Now, flip the elastic back around to its normal position behind the mask. Next we'll secure the battery holder to the back of the mask. We'll do this with three zip ties, as shown in the figure at right. The two zip ties to the left and right are passed through the mesh fabric of the battery holder and then secured *loosely* around the elastic on each side of the overhead strip. If you avoid tightening these zip ties all the way down, you'll have a bit more

flexibility in how the battery holder hangs. The third zip tie attaches to the middle of the battery holder and then goes around the overhead elastic only. This keeps the battery holder (and therefore the battery) roughly centered behind the head.

6) In our last stop to involve zip ties, we'll attach the USB power cord to the overhead elastic. This keeps it roughly in place as it runs from the forehead to the battery in the holder behind the head. The main problem here is that the elastic stretches, while the USB cable does not. So, you want to put some zig zags in the cable when you secure it, as shown at right. We usually put a zip tie close to the forehead to keep there from being tension on the electrical connections by the switch, and then did two or three more zip ties between the front and back. Tighten these zip ties all the way to try to keep the USB and elastic together. (Note, there's a piece of paper behind the cables in the picture, just so that we're not taking pictures of black things on a black background.

7) Next we'll attach the eye covers. We've noted before that they should be sanded inside and out so that they are translucent, not transparent, and hopefully you've created the half-moon cuts in the masks so that the covers sit nicely facing forward. If so, then the first part of this is easy, just secure the covers in the cuts with a bit of hot glue. Just doing this from the outside is fine. Mount both left and right eye covers before the next bit. Now, once both eye covers are mounted we want to get a bit fancier with the hot glue. When you first attach the cover, there will be a gap between the mask and the side of the cover that is not in the cut. If you leave it like that, the fabric cover may creep between the LED and the cover, so instead we want to build a bit of wall out of hot glue there. This isn't as hard as it might sound. First, make sure you are using a low-temp glue gun so that the glue cools relatively quickly. Then start by putting down a ring of hot glue under the edge of the cover as shown at right. Then keep adding to that ring so that it gets taller until it reaches the edge of the eye cover. You can switch from

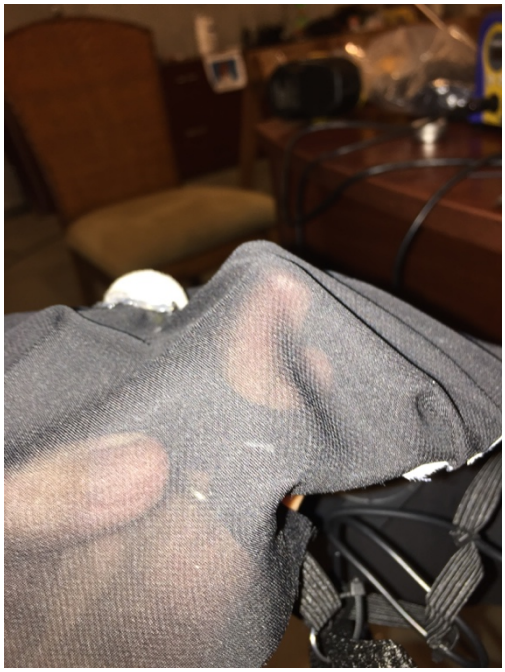
the left eye to the right between each layer to give it a chance to cool, and you can also add a line of glue around the bottom of the eye cover to work downwards as well as upwards. When you're done you should have something that looks like the pic at left. Perfection is not necessary, as long as you've got enough connectivity that the fabric won't get underneath… At this point we are done with everything except the fabric cover and adding some padding. Insert the battery into the battery holder, plug in the USB cable and test the thing to make sure the fans run and the LEDs are uniformly lit.

8) Fabric covers the entire front side of the mask and hangs down a bit to help cover the neck. It has holes through which the eyes protrude, and is secured around the mask edges with tape and around the eyes with hot glue. Getting appropriately sized, shaped and spaced eye holes in the fabric was a nagging issue for the Great Jawa Build. You can make the holes by hand with small scissors, fitting it to a mask periodically to see how close you are, what you need to trim yet, etc. But that's a slow, cumbersome process more suited to a single mask than to building 100. After much trial and error, I came up with a nice scalable solution to fabric holes that happily involves fire. We wanted 1" holes, so I acquired a couple of 1" copper pipe "join" fittings, which have a 1" inside diameter. I drilled appropriately sized and spaced holes in a piece of 2x8 lumber, inserted the pipe fittings, added a clipboard to hold the fabric and a couple of board on the bottom so that the apparatus would stand upright. The result was the monster shown at the right. If you hang a piece of fabric on the front of this, and apply a propane torch through each of the holes you have appropriate holes in seconds. Video of this happening can be viewed here: https://www.youtube.com/watch?v=lxNjGQRZTrg Again, if you're doing one mask, this is probably not your solution, but if you're doing a bunch, it works pretty great.

9) Once you have the appropriate holes in the fabric, secure it to the mask with hot glue around the eye holes. The best way to do this is to set the fabric in place with an eye

protruding through each hole. Then fold the fabric back to expose one eye, put a line of hot glue on the mask around the eye, flip the fabric back and press it down onto the glue. (Once again, a low-temp glue gun is your friend.) Do the same for the other eye and you're set.

10) The next step is to secure the fabric around the top edge of the mask. You want the fabric to be pretty tight towards the top, but pretty loose at the edge of the eyes. This allows eyeglasses to poke through the enlarged eye holes but still be covered by the fabric. Start near the top on one side or the other of the over-the-head elastic. Cut the fabric so that it extends only ¼" past the edge of the mask for an inch or so. Then tear off a ½" or so strip of gaffers tape and tape the fabric to the back of the mask as shown in the picture at right. With the fabric covering secure at the top, move to the and cut the remainder to length. The overhang should be at least 1" or even 1.5" where the side elastic attaches. Start trimming there, moving towards the center while gradually reducing the overhang until you're back to just ¼" at the top. Now, starting at the side, secure the fabric to the back of the mask with strips of tape. Remember the goal is to tape only the ¼" of fabric at the edge, leaving the rest as excess hanging in front. Nobody will see this in the darkness of your Jawa hood, but those who need their eyeglasses to see will require it. When you're done, you should have excess fabric in front, as shown at right. (Fingers sticking through eye hole to show extra fabric. Tape is still behind mask.) Repeat this process for the other side of the mask.



11) You should have a fair bit of fabric hanging down from the bottom of the mask, which will help to hid your neck. You can count on tucking this fabric into your robes, but experience has shown that tucked fabric comes untucked relatively easily. The solution we've settled upon is to add a strip of elastic to the bottom of the mask fabric. Leave the elastic long enough to wrap around the back of the wearer's neck and add a small piece of Velcro to each end to keep it in place.

12) Our last step is to add some padding to the inside of the mask. We found that you really need three pieces of padding: a piece on each fan, and a smaller one on the chin (mostly because our masks could be a little rough there, so this was for comfort). The padding we used was self-adhesive, so we had the pieces pre-cut, and just had to peel and apply. The inside of the mask with the padding applied is shown at right. As a last little cleanup, when you apply the pad to the chin, it probably lands on top of some of the pre-existing holes in the mask. To avoid having the sicky white underside of the padding exposed on the front of the mask, flip it over, push the fabric up, and apply a piece of gaffers tape to cover the exposed underside of the padding.

YOU'RE DONE!

UPDATES FOR OFF-WORLD JAWAS

What we've done for off-world jawa masks is just a slight variation on the original masks. First, for the red eyes, we're using these:
https://www.amazon.com/gp/product/B01CI6EWHA/ref=ppx_od_dt_b_asin_title_s00?ie=UTF8&psc=1
(Chanzon 10mm Red Diffused LED (Frosted Lens Round))
The voltage and current on these is similar to the yellow so the same current-limiting resistor value will work. Also, the eyes on the off-world jawas are smaller, so you don't need the vending machine balls, *and* that means you don't have to do the awkward crescent cuts in the masks. (This is a big win.). So, same masks, different color LEDs, no plastic covers and smaller holes in the fabric. Easy.

NOTE: we built these masks before the Off-World Jawa CRL came out. The CRL says the eyes are approx. ¾", which is about 20mm. If you can find some 20mm translucent cover to put over the red LEDs, that might be more accurate, but 20mm is not a common LED size. Finger's crossed that 10mm will work.