



3D Printed Band for Apple Watch

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<https://learn.adafruit.com/3d-printed-band-for-apple-watch>

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Overview

3D Printed Wristbands

In this guide, I'll show you how I 3D printed a custom wristband for my Apple Watch. The goal for this project is to inspire you to use 3D printing and flexible filaments to make wearable parts. Ninjaflex is a TPU (Thermoplastic polyurethane) based filament. It's very flexible and pretty strong. This filament can be 3D printed with most FDM style desktop 3D printers. Because this material is super flexible, it can be printed flat on the bed [of a 3D printer] but wrap and form around any given shape. This means you design flat geometry in CAD and not have to worry about getting the exact curvature. Pretty cool!





Utility Wristband

With 3D printing and CAD, you can pretty much come up with any idea you deem interesting. For example, I designed a "Batman utility belt" inspired wristband that can hold a number of tool bits and an audio adapter – In my case, I kept losing my audio adapter [for the iPhone 7] so now I fit it onto my wristband and can carry it around with me. A simple solution for an otherwise simple problem.

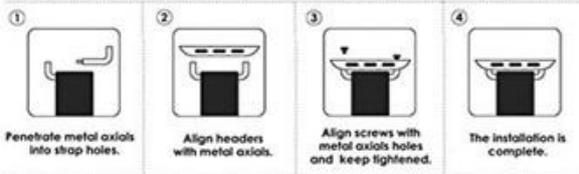


Parts, Bits and Stuff

Other than the Apple Watch, the most important bits needed to build this project are Apple Watch connectors. These are specifically designed to work with the Apple Watch and feature the quick release mechanisms. These connectors feature an axle that is secured with tiny screws.



Here are the steps to install/remove the watch lug:



Connector Clasp Adapter Buckle Thing

Unforunately [obviously] Apple does not sell these connectors. But, they are available to purchase from online retailers like Aliexpress. They'll set you back about \$3, so they won't have that Apple price-tag. They're pretty easily to use, machined out of metal and come in different colors.

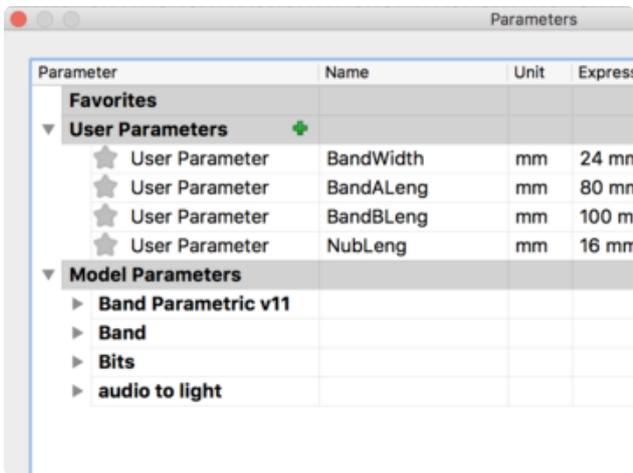
Get Apple Watch Connectors from Aliexpress

Tools & Supplies

You'll obviously need access to a 3D printer but if you don't own one, but still want to make this project, you can try using a 3D printing service such as MakeXYZ or 3DHubs and have them 3D print them for you.

- [Apple Watch Adapter Connectors \(\)](#)
- [3D Printer \(\)](#)
- [Ninjabflex Filament \(\)](#)

3D Printing



Custom Fitted Wristband

I designed this wristband specifically to fit my wrist. It's 220mm (2.2in) in diameter. Unlike many of the official Apple Watch bands on the market, this one does not contain any sizing holes. If you'd like to 3D print my design, but have different size wrist, you will have to modify the CAD files. Not too way, it's not too difficult! I designed the band with user paramters – So it's [relatively] easily adjust the overall length of each band. I put together a "Layer by Layer" tutorial on how to do this.

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3D Printing Flexible Filaments

If you haven't 3D printed flexible filaments yet, don't worry! We have a dedicated guide on how to 3D print with ninjaflex. Click the green button below to launch the guide. Below are some basic settings for reference.

- 235/240C Extruder Temperature

- Non-heated bed – [blue painters tape \(http://adafru.it/2416\)](http://adafru.it/2416) or [PrintInZ surface \(\)](#)
- Heated bed – 50/65C
- 30mm/s default printing speed
- 60mm/s movement speed
- 50% first layer speed
- 1mm retraction distance
- 30mm/s retraction speed

3D Printing Ninjaflex Guide

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3D Printing 2-color filaments

You can achieve a "dual extruded" 2-color print with a single extruder 3D printer by swapping out the filament during the print. By using the "pause" feature, the 3D printer will rest the extruder, allowing you to change the filament mid-print. If your 3D printer doesn't have this feature, you can set your slicer to print only a portion of the model. In this project, I told my slicer [Simplify3D] to print only 1mm of the band. Then, I used the "start/stop" layer modification feature to start the printer at 1mm. For a step by step tutorial on how to achieve this in Simplify3D, check out our [3D Hangouts video \(\)](#).



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Assembly



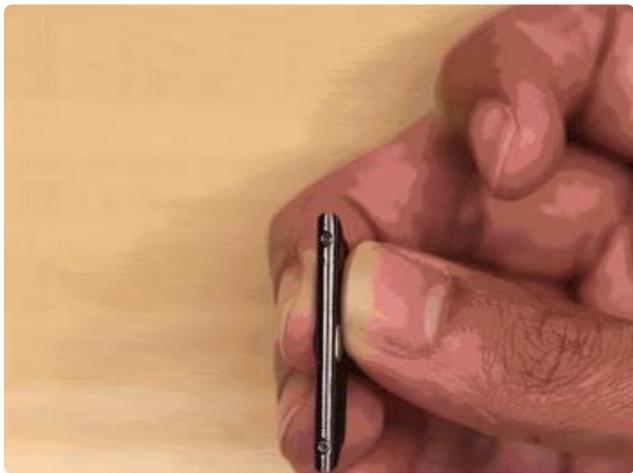
Remove Bands

Once I had my parts printed and ready, I start by removing the stock [sport] bands from my Apple Watch. The Apple Watch features a "quick release" mechanism that makes it easy to remove. Just press and hold on the middle button and pull the band side ways to remove it.



Install Connectors to Bands

Next step is to install the connectors into the bands. These will need to be installed in the correct orientation. You can reference the photo on the left for getting the correct side up. You'll notice each connector has three little "bumpers" across the stem. They're black on one side. On the other side, the middle bumper is gray/chrome. The side with the three black bumpers should be "face up" with the "top side" of the bands.



Unscrew Axle

The axle is secured to the connecting bit with two [tiny] machine screws. I'm not exactly sure what size screws they are, but I didn't need to worry about it because the connectors I purchased came with the correct size screw driver. Later, I tested and found a 0.8 Star Bit works fine. You only need to remove one of the two screws. Be very, very carefully when doing this! I say this because they're so small that I lost one of them while unscrewing it. They're that tiny! So make sure that you're close to a worksurface when unscrewing, so if it fall out, it won't bounce off the table and fall onto the floor [never to be seen again]. With the screw remove, the 2-piece axle will slide apart.





Install Connectors to Bands

With the screw and second piece of axle remove, you can then insert the remaining axle into the cylinder of the band. Then, grab the second axle piece and slide that into the cylinder. You'll need to reinstall it into the little cavity in the stem, reinsert the tiny screw and fasten it back into place. Again, being very cautious not to lose that tiny screw!



Install Connectors to 2nd Band

You'll need to repeat this process for the second band. Again, being very careful when handling those teeny tiny screws.



Install Bands

With the connectors now installed and secured to the bands, you can install them into the Apple Watch. And that's pretty much it for the assembly!



Install Audio Adapter

The lightning-to-audio adapter for the iPhone 7 can easily be fitted to the little sockets on the band. Nothing really much to it!



Install Tool Bits

Same thing with the tool bits. The little sockets are sized for a hex body type tool bit with a diameter of 4mm.



Finished Bands

That's it! Now we have our finished bands. Which ever one you choose is up to you. I personally use the non-utility one (the one with the gray hexagons). Honestly, I hardly need to use the audio adapter thing because I don't drive all that much. I made it was mostly for conceptual purposes $\sim_(\text{ツ})_/\sim$

Wear It!

The main thing I wanted to solve with this band was to make it easy to wear. In my first design (and other wristbands) I had a single circular "nub" that gets inserted into a little hole. I found this problematic (and difficult to strap with one hand) so I extened the "nub" into more a rectangle. This way, the surface area was easier to press through the accompanying hole. I added a second "nub" for a bit of extra security. Works out pretty well!