Panoramas are awesome. They’re all big and full of majesty and stuff. Just about any smartphone these days can take one, and it takes nothing but a sharp eye and a steady hand.

But you’re too smart and clever to be satisfied by that. You want to know how to do it yourself. Maybe because you want to use a better camera than the one on your phone. Or maybe you want your pano to go up and down instead of just left to right. Maybe you have some other fancypants reason I can’t even think of. Whatever, I’m not a mind reader. Let’s make a panorama.

**Ingredients**

You will need—

1. A camera. (Use your cell phone if you want. It’s fine.)
2. A computer with the following software installed--
   - Hugin. A free and open source picture stitcher that makes panoramas. It’s going to do all the heavy lifting for us. Download it from [http://hugin.sourceforge.net](http://hugin.sourceforge.net) and install it.
   - (Optional) A picture editor for cropping and resizing. Be fancy and use gimp or photoshop, or be conservative and use MSPaint. Your call.

**Do This**


2. Take a bunch of pictures! Make sure they overlap. Try this. Mentally divide your shot into thirds. Pick something from the right-hand third in shot 1 and make sure it appears in the left-hand third of shot 2. While still framing shot 2, pick something in the rightmost third to reference for shot 3. Chain your shots together mentally in this fashion.
Got all your pics? Great. Get ‘em on a computer and open up Hugin.

**Hugin**

For our first pano, we’re going to do everything in the Assistant tab. And in this tab, the entire process is completed in three steps.

1. Load Images. Select your pictures from the file browser.
2. Click on Align, and then wait a minute. When it’s done, a preview will pop up. Neat! Close it.
3. Click Create Panorama. It will ask where to save the PTO project file, and where to save your panorama image. (It will save as a TIFF file, and that’s fine. We can change it later if we want to.) Creating the panorama is a lengthy process. Have a coffee or tell some jokes or something.

Now it’s later, and Hugin finished exporting the file. Look, how pretty! Pat yourself on the back. Or on the belly. It’s easier to reach and is kind of more satisfying anyway. And panoramas are delicious. Mmmmm.

Optional final step: load it into a photo editor for cropping and resizing.

**Next Steps: Fine control and adjusting settings**

So you just took the easy route to making a panorama the hard way. You can choose to be satisfied with that if you want, but I think we both know you better than that. Sooner or later, you’ll want to get under the hood and mess with stuff. Here are a few places you can start exploring and messing around.
Mask

In the Mask tab, you can select portions of pictures that should not appear in the final image.

For example, consider these two pictures. Some dude is walking though the background in the shot. I think we should use the mask tool to remove him.

Click on Add new mask and start clicking around the offensive area to start drawing a polygon. When you’re satisfied with your shape, double-click to stop drawing.

I can see in the preview to the right that we have successfully “masked” the photobomber out.

Preview and Fast Preview

Use Preview and Fast Preview give you an idea of how your finished product is going to look. Perhaps the most fun thing to mess with here is the variety of different projections.

“Projections” are different ways the program can try to flatten your pano. Try a couple out. Some are pretty funky.

Note that previews open in separate windows. You can close them safely without losing any of your work.
Control Points

Hugin auto-generates hundreds of “normal” control points, which are spots in the overlaps between pictures that it recognizes as being the same spot. It uses these spots to stitch the pictures together, and to adjust the colors and exposures between pictures.

In the Control Points tab, you can also see “vertical line” control points that Hugin uses in creating the panorama. You can try adding some vertical line control points if you want by clicking somewhere in the left-hand picture, and then clicking somewhere in the right-hand picture somewhere along the vertical line between the two points.

Optimizer and Exposure Tabs

If we’ve been playing with options and settings in the other tabs, we should re-optimize our project. In each tab here, click on Optimize Now! And then say Yes to Apply Results.

Stitcher Tab

This is where the actual “doing of stuff” happens.

Click on calculate field of view.

Enter a final size, or calculate the optimal size.

Change the output format if you want.

Finally, Click stitch to start the batch process!

Look at the canvas size: 11852 x 3819 is huge. This final image, when reduced to 300 dpi, is 58 inches long! Still, probably better to just auto-calculate here, and get it ready for the printer later in Photoshop or something.

That’s it, man. You’re done.

Go out and take some pictures. Make some more panoramas.