

[Link to Timelog](#)

10/27/2016 - Started work on 3D printed, less detail version. Made significant process, refining details and band holders are the next step.

10/31/2016 - Finished up the case of the watch. Ran into some difficulty with the band holder pieces, will potentially refine later. Created the second hand, one extrusion.

11/2/2016 - Completed the minute and hour hands, quick part files.

11/3/2016 - Created the stopwatch knob and the main movement knob. Assembled an early version of the 3D base.

11/10/2016 - Began research for watch band. A flat band won't work because the material isn't flexible. I think I'll have to adapt a link design, small pieces linked together by little rods. However, I'm not sure if this would actually be flexible. Started to do some test designs. I'm not sure how I feel about doing this because I'd have to design a clasp. I think I would need some actual metal components like screws or perhaps pins but I'm sure this can be arranged.

12/8/2016 - More research for the bands. Did some sample experimental sketches. Did some sketches for the animation. Did some research into the timeframe of the project.

12/12/2016 - Did some initial experimental work on the watch. I designed a basic part file based on a more solid watch design. The piece would be printed as 2 separate parts. Since the watch band can rotate around the y axis a solid piece would work, but I need a better mechanism for connection. So far I developed the piece so that it would sort of plug into the other piece of the band, but this has much potential not to work and is more just based on the actual 3D printed plastic component. I want to make a better design than this, but this might serve the purpose.

12/13/2016 - I started some prototyping with another watch band design, I'm going to stick with the single fit design for myself but use the same clasp mechanism that my watch has. Mr. Nocella recommended a more linked design, so I think I'll experiment with one of those. I started working more on the clasp in the hope that I can just apply it to the first design I made. Finished the clasp but haven't started incorporating it in the design yet.

12/20/2016 - Added the actual clasping mechanism to the clasp base. Had some trouble with the design and rounding, took longer than expected.

1/9/2017 - Started work on the watch band actual version instead of experimentation. Has to be done this week. Made great progress during double block. Made a refined version of each watch band, top and bottom. Both solid pieces, so no internal flexibility. Made a brief experimental assembly. Shows great potential. Should work fine. Going to add some refining

measurements, and ask Mr. Nocella to do a test print. Fairly confident right now. Should be on time.

1/12/2017 - Did some detailing work on the pieces. Adjusted some of the sizes for strength correlation with the actual 3D print. ABS plastic is rather flimsy. Rotating pins may break, resulting in no rotation possible. Still probably the best method. Links require too much assembly. I need to make a small pin for the piece that connects the band to the actual watch face. I'll probably do a section of this test assembly to conserve on print material for a test print, I'm fairly confident it will hold. As long as I'm careful not to pull or mess around with it too hard it should be fine.

1/13/2017 - Finished the detailing work I described yesterday. I made the pin for connection. Assembled the caps onto the watch band connector. Final assembly is done. Did some checking over for flaws. Sample sectional views. Going to print soon hopefully. Still on schedule, watch band is technically done at this point. Potential redesign in the future - pretty happy with this version. The next two weeks are working on the 3D printing, so I can explore alternate options during that time if I feel like it.

1/17/2017 - Did some file management for all the pieces and assemblies. Worked on deleting old copies and assorting the final copies. Did some slight changes to piece detail here and there. Created STL's of all the files in preparation for 3D printing. Took out the watch hands so that they can later be 3D printed for the actual print on top of the paper texture piece. Changed the diameter of the knobs so that they fit perfectly without any space for the 3D print.

1/18/2017 - Did a bit more final details, decided to re-add the watch hands and I made a small cap for them. Should print fairly easily. Might be too small to get some of the fill material out, but I can always optimize this later. Fairly confident at this stage for the first 3D print. Going to fuse the pins to the watch band for increased structure stabilization. The watch dials need to be beefed up a bit. It's a hassle to redo all the STL's every time I make a small update, perhaps this could be a challenge to write about. Kinda mundane.

1/27/2017 - 3D print is finished. It came out looking really nice. Unfortunately does not work. Clearance on the holes for the pins was a fair amount, but too small for the 3D printer to recognize. Design was good, but the materials were not. Plastic broke off too easily. Flexible material or a 3D printer would be ideal if I were to print it myself. Superglued the bands for looks, overall happy with the result. Did some file management for the pieces, put all the 3D printed versions away. Started a new folder for the CAD Version. Copies of all pieces in place is the next step. Going to start work on stage 2 of the project next week.

1/30/2017 - I finished reassembling and formatting all the 3D print version files over to the more detailed version. Basically I made a copy of every piece, renamed them, and put them in a new folder. I added some minute details, and then reassembled the piece again. The purpose of this was so that I can make edits and changes (such as detailing work) without messing with the 3D

printed version. I created the glass top and did a bit of early texturing. My original plan said to texture the base this week, but I'm going to get a head start on the watch mechanism and push the texturing all back to one week. Texturing itself shouldn't be too difficult. Started some research on the watch mechanism. I found a plan for the watch movement that I roughly think I can create. Looks pretty solid. It's in a different language, so I might have to interpret a bit. But numbers are numbers, and the design looks good. It won't be the same movement that's actually in my watch, but it is pretty similar since it has the 2 positions of the main dial.

1/31/2017 - Started some work on the main base of the movement. Lots of measurements. Found a better technical document. Going off measurements off grabcad, mostly will be imprecise. Close enough for looks though for sure. Not actually going to be used for manufacturing. The movement will be a lot of work.

2/2/2017 - Plugging away at the base still. Just adding the holes individually. The measurements aren't perfect. Using the measurements from the technical documentation and example 3D part.

2/3/2017 - More work on the 100-plate, piece is taking a while. Too many basic extrusions.

2/7/2017 - More work on the 100 plate, lots of measurements take time. Not difficult but complex.

2/8/2017 - More work on the 100 plate, finished the top, starting to work on the back.

2/13/2017 - Need to rethink this approach. There's no way I can gather every single measurement from the example I downloaded. It's too much pure effort without any learning at all. I think I'm going to instead do a redesign of a much less complicated piece. I'm going to use the example I downloaded as a sort of tutorial and design my own but with much less components, probably less than 10. This will help me better understand the mechanism behind the watch. That way I can show how I designed my own and explain how the actual watch works during the presentation.

2/14/2017 - Started some sketches based on the movement. Deleted a bunch of parts from the example to make a more manageable piece. Got most of the teeth measurements done and will begin to construct pieces and add details later. I should later scan the sketches and put them in the presentation.

2/15/2017 - Finished up the sketches, found the widths of the pieces. Started constructing the gears.

2/16/2017 - More gears and designs.

2/27/2017 - Worked on the gears some more, got a decent amount of them done. Couple more to go. Bit behind schedule.

3/1/2017 - Finished up all the movement parts, going to start assembly soon.

3/2/2017 - Started the assembly, made three distinct assemblies for the majority of movement parts. One final movement assembly made of those three parts. Then a third, and completely final, assembly that includes the base.

3/6/2017 - Sort of finished the assembly. It doesn't look that great. I need to fix up some pieces and work on optimizing the base. I'm going to keep with schedule and work on texturing, and hopefully get back to that. I finished all the textures for the outside watch this period. Some need a little more optimizing, and can perhaps be made better. I need to import a picture of the watch top to the front of it.

3/7/2017 - Finished up all the textures, overall looking solid so far. Need to work on creating some renders. Did some touch ups to the final assembly. Starting to look nice. Added the top to the 100 plate. It's done at this point. But it's rusty and wouldn't work in real life, I want to try to make it a bit more realistic. Finished the exploded view of the final assembly. It looks really cool, I have to work it into an animation now. I'm not sure if I will use Maya or if I will just use Creo and export it into an animation, I have to see if that's possible.

3/13/2017 - Did more work on trying to get a nice picture. Detailed the scene that the piece is in. Had to mess around with the Ceiling textures, changing the tiling quantities so that the size was more accurate.

3/14/2017 - Finally nailed down the scene, maybe need a little more work on some of the metal texturing. Overall, it came along nicely. Got some screenshots of renderings in various viewpoints.

3/15/2017 - Decided I wanted to get some nicer screenshots. Playing around with lights and settings. Each render takes like 10-15 minutes, so it's time consuming.

3/20/2017 - I've researched a bit into cycloidal gears. It will be impossible for me to change all the gear tooth profiles to be cycloidal. Instead I'm going to put some research and stuff into the presentation, and talk about how my actual watch movement wouldn't work in reality. I'm going to instead work on some refining details and making sure the presentation is good. Worked in photoshop to try to get the image of the actual watch. A little blurry but it looks nice. Tricky inserting it into the final assembly though. Got the texture in, now need to take some updated screenshots.

3/22/2017 - Checked out ThingWorx by Creo to showcase some of my parts during Senior Night in a cool and accessible way. Worked on some screenshots for the final render with the uploaded image for the watch face.

3/23/2017 - Applied for the Creo ThingWorx, don't know if I will get accepted into the beta by the time of my project. Perhaps though. Worked more on all the images I will need. Setting up the final folder. Finishing touches next week. Started a document to put them all on to print. I have to resize them all in photoshop to $\frac{1}{4}$ the size of a normal piece of paper to fit all 15 on the poster board.

3/27/2017 - Resized all the images into the correct form. Looks great. Just need to print. Then I'm pretty much all done for now. Might try to improve a bit for the final presentation, but for now it's pretty solid.

3/28/2017 - Worked on animation.

3/29/2017 - Finished the animation, converted to MPEG, difficult to learn. Working on extracting animation to the sketchfab model. On friday have to finish that off.