

THIS = THEN = THAT

FINAL ARTIFACT REPORT

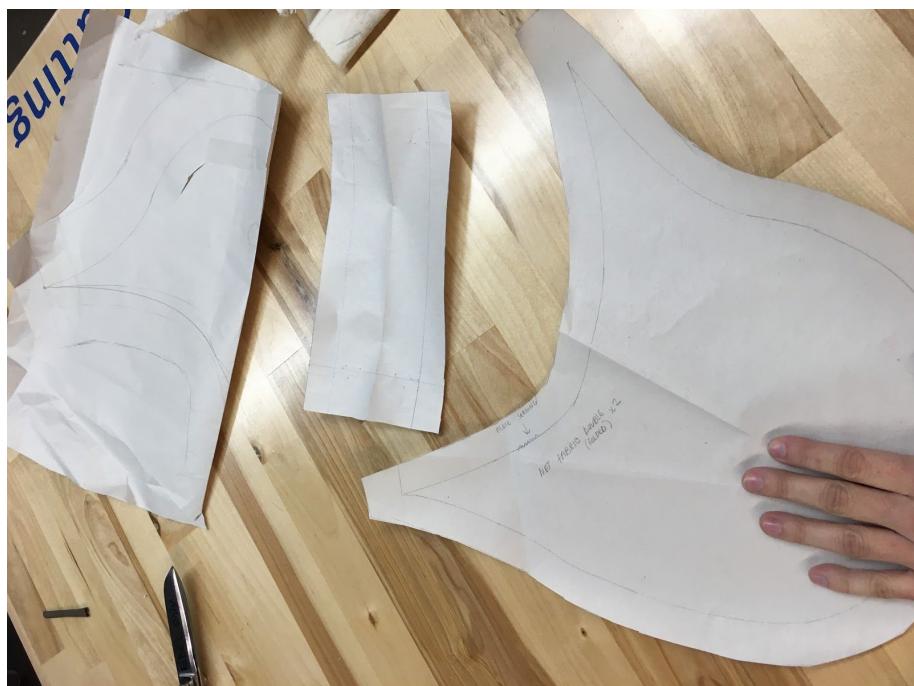


~ PROCESS

Following our prototyping, the elements needed for the success of the project were clear. Yet, the exact process to reach our objectives were still to determine. Since the prototype worked in itself, we had to make the system work on a wearable. For that, we needed to solder, sew and assemble each component. Sewing and soldering were done parallelly, while the assemblage was done at the end.

For **sewing**, there was still a lot of configuration to think about. Following the recommendations of the teachers, we decided to revise our wearable sketches. First, the collar seemed to be not really comfortable, especially if we consider the weight of the pocket (contains the arduino and battery). Secondly, the velcro system seemed a bit too chunky and rough for our concept, which is meant to portray organicity, intimacy. So, we opted to change the velcros for a corset mechanism, which would allow the removal of the collar AND be an alternative for the velcros. Another important aspect to consider was to keep the wearable adjustable in some places while solid in others. Therefore, we thought to mix a stretchable fabric as yokes to the non-stretchable fabric. After sketching, we obtain a logically functional plan, where the yokes have an organic lung-like form. For the fabric, we chose to mix the underside of a grey-brown lining satin with a stretchy see-through blue-grey polyester. To make some parts stronger (like the waist-corset), we doubled the satin with a simple beige canvas.

To make the pattern, we started from a medium-size woman's template pattern. We then proceeded to draw the different pieces/yokes. After that, we superposed the pattern on another layer of paper et isolated each component and added 2cm for sewing where needed. Cutting the fabric was particularly difficult because of the fabric we chose; the layers were sliding a lot.



Sewing was a lot of machine threading, ironing, unpicking and serging. We first doubled the satin where needed with the canvas. Then, we assembled the yokes on each side of the body. Put together, the whole front was made. After, there was a long step to do, which was to individually cut and sew the straps and loops for the corset.



After making the front side of the garment, we did the lining. In the lining there was a chest piece that would be layered in a way to show the LED red light system while hiding any PC board or soldering. In that sense, it was also important to create a pocket to insert this board. Also, one layer of lining has to make the whole back of the face piece; this is to allow the wiring to minimally touch the user's body and for cleaner aesthetic.



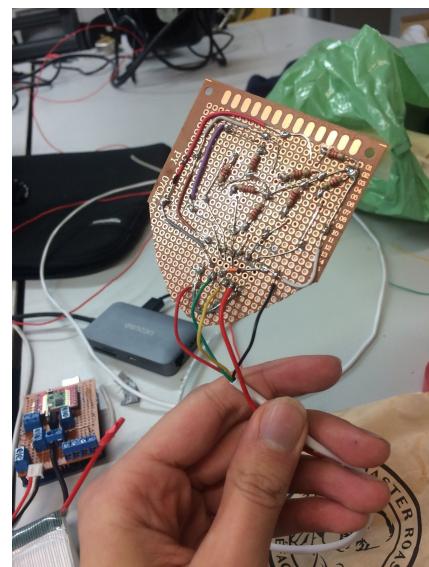
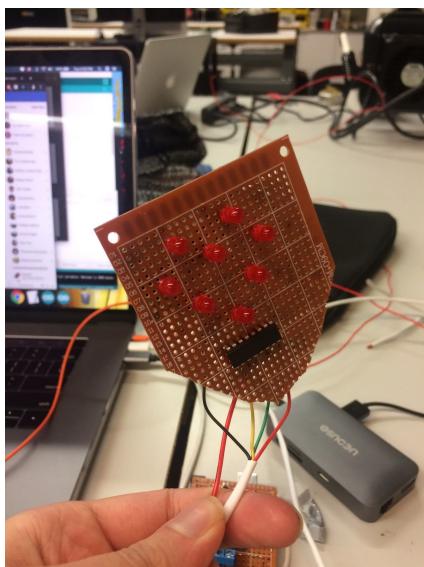
After that, we had to sew to the garment the little rectangle of conductive fabric at bottom opening. Attached to the non-stretchable panels, the conductive fabric will stretch when the user expend its thoracic cage for breathing. To conduct the data to the arduino, we have to attach on each side the earth and ground. This is done by making loops with the end of each wire and to sew them tightly on the conductive fabric with conductive thread.



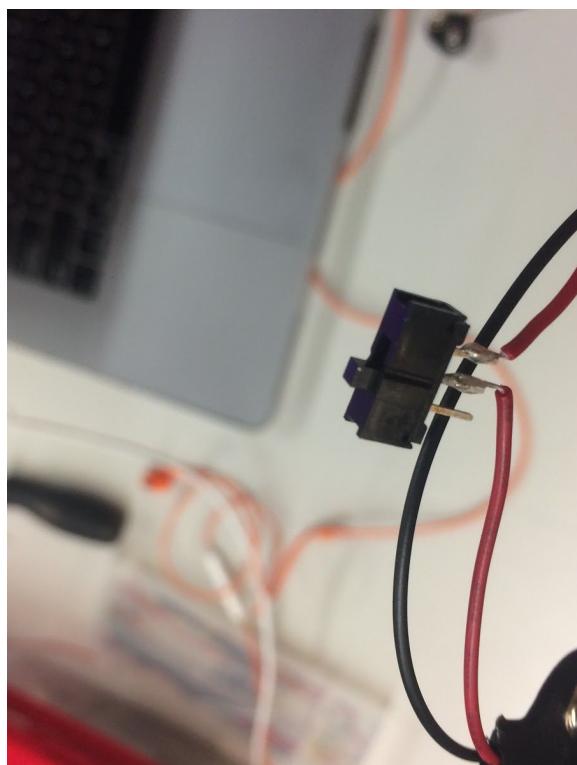
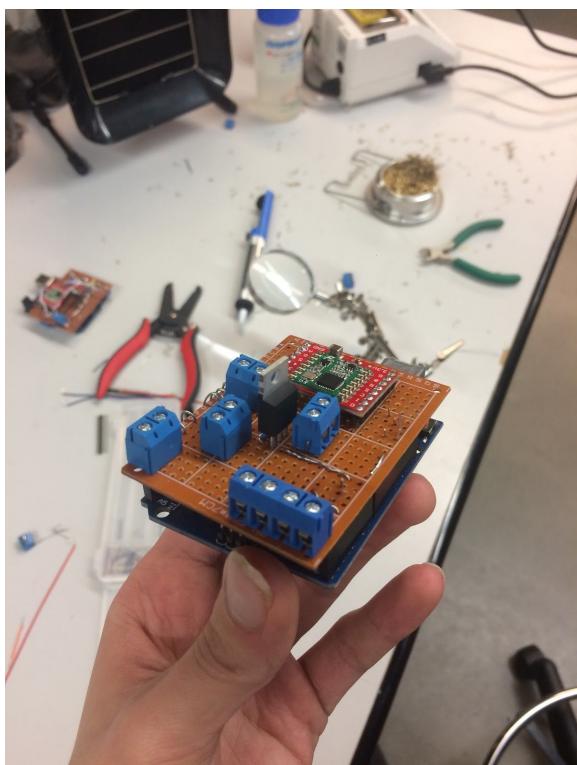
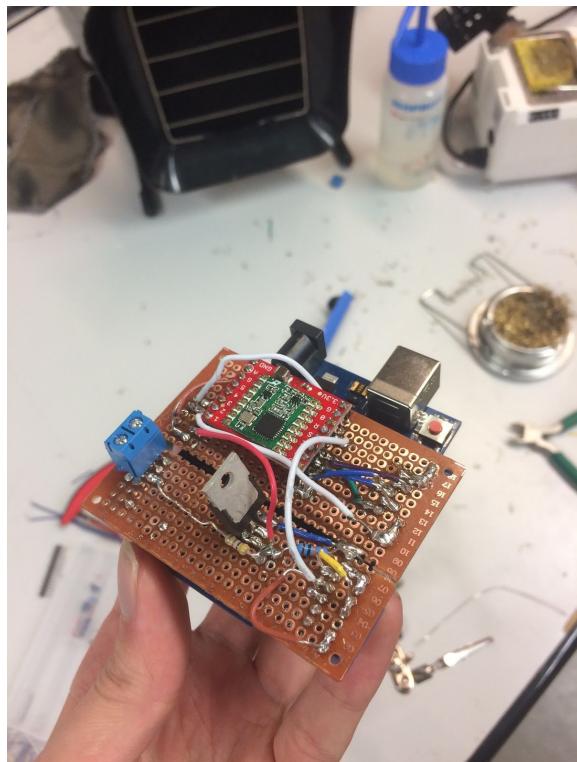
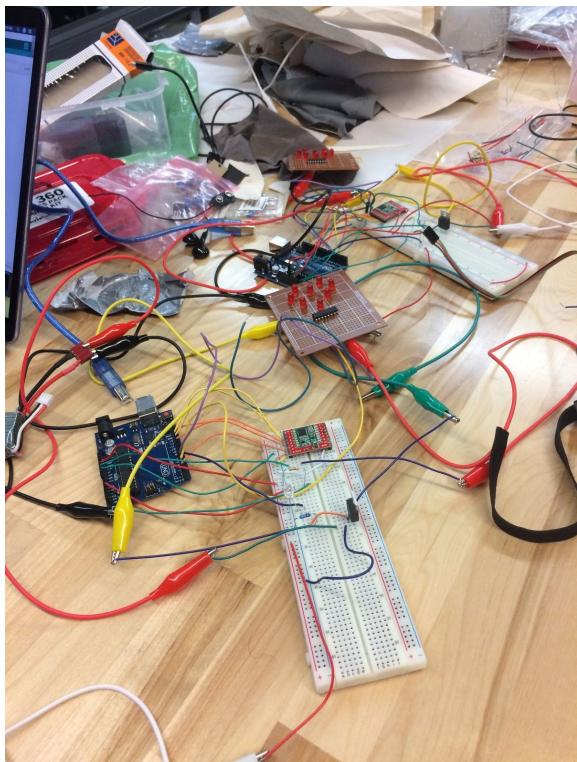
The next step was to insert the heating nickel chromium between two pieces of double satin with canvas. For the purpose of aesthetics, we decided to work with the canvas first and then to place the whole part in the satin pocket. The challenge was to sew between the wire spirals so that they would never touch each other, to avoid a short circuit. After testing with a DC, we soldered the earth and ground to the extremities of the nickel chromium wire and serged the pocket.



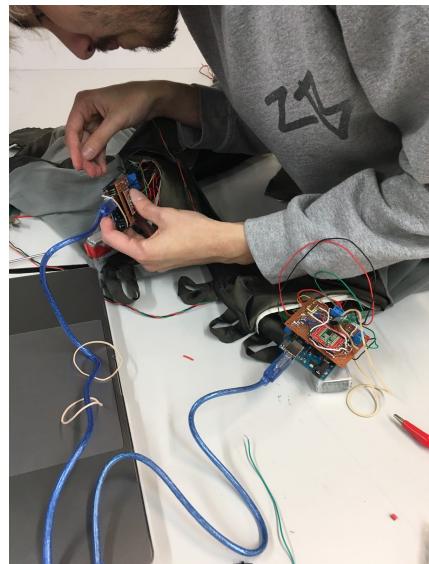
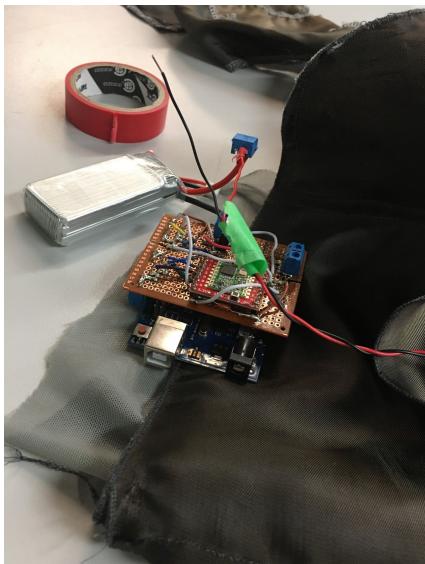
In parallel, we did the more extensive **soldering** part. First, we made the circuit on a PC board for the heart shaped LEDs. After testing, everything works. It was particularly difficult to plan that the wires do not cross each other, especially with the heart shaped pattern.



Yet, the biggest soldering job was definitely the one connecting the pins to the arduino and the switch to the battery. This was an important step since we did not want to solder the wires to the arduino directly. So, we soldered pins on a PC board so it can fit perfectly with the arduino. The circuit is also made on that board.



After testing each component separately, we corrected some mistakes of wiring. Then, it was time to **assemble** the components together in the garment. TALK ABOUT DEBUGGING



~ INSIGHTS AND FUTURE DEVELOPMENT

During this process, we encountered a few challenges. First, it was timely challenging since there was not one but two artifacts to make. This doubles all the steps stated above. For the sewing, there was definitely problems in the logistics for the steps. Perhaps, having more time, we would have done a tryout version to identify the problems before attacking the actual garment. The unpicking and the bad step order made the finish look really crafty. In a sense, it is crafty. Yet, there is a lot of sutures and areas that could definitely be more clean. For the soldering part, it was especially long and difficult since there was a lot of connections to make (about seventeen connection for each). A lot of them needed to be crossing each other, which made it especially tricky to do the circuit.

We underestimated the complexity of our ideas but managed to find solutions. The LEDs needed a shift register to allow us to control eight leds singularly with three digital pins (plus power and ground pins). For the heater system, we needed to control the amplitude of our 7.4V-1.5A battery. For security and practical reasons, we control the voltage of the external battery, something that the arduino can not do by itself. These modifications and the addition of the battery made us use different resistors than our previous prototype circuit schema.

In the future, there are a lot of aspects that need to be implemented and reviewed. The radio is the main issue (if not the only one) that seems to prevent us to really present the wearable on users in space. With the battery, they do not communicate with each other. It is surely a problem of

grounding, since it works when the arduinos are both connected on the same computer (power source) instead of the batteries. For the garment, it would be interesting to remake it with a logical order of steps to avoid making the same previous abrasive mistakes. It would also be important to revise the pattern for the bust area, since it falls a bit awkwardly on the body. Also, just a general cleanup of the sutures and form would be important to create the best aesthetic and comfortable result. The switch should also be more apparent.

Ultimately, we wish to correct the mistakes we made so to make the project functional and aesthetically more pleasing. Hopefully, these tweaks will allow us to explore the desired performative and introspective aspect of the wearable via user's experiences within the appropriate space.