DOCUMENTATION
CART_360
YANN-MAURICE_MCNIVEN

PROJECT:

AMBIENT_ASSIST

GITHUB:
https://github.com/spacemanjan/CART360/tree/master/FINAL_PROJECT

FOREWORD:

At the time of writing this documentation, my project is still non_functional, it is upsetting, frustrating, and incredibly disappointing that despite my best efforts, my refusal to draw a hard line and send in a half baked project on time and instead persist in attempting to make it work beyond the deadline (with grade penalties in mind) have yielded bitter fruits. I've gone into the heart of working with multiple microcontrollers and have found it to be both incredibly frustrating (lack of debugging abilities) and finnecky. Upon reflection I think it would have been better to attempt something completely different, much simpler and achievable which I could have at the very least have handed in on time. There is a lot of regret looking back, however "what's done is done" and there isn't much use in dwelling on that foreign country.

RESEARCH PROCESS:

My research process began with my initial idea "paper hearts" a device which through light and potentially sound would tell the user about their underlying psychological state. My idea was that heart rates and their fluctuation could be read to remove the veil of the clouded inner world. Although this idea was never realized due to it being much more complicated than I could imagine and also heart rate sensors being notoriously unreliable, it did hone my primary form of interaction between user and object as being with lights and sound.

-INSERT IMAGES OF FIRST PROTOTYPE HERE-

My research led me to looking into all points of data on light: RED for example is best for sleeping, photosensitive cells in the eye called ipRGC's they are the most sensitive to blue wavelengths and least sensitive to red wavelengths i.e. red light helps you sleep because it is the least distracting.

Articles on light and the human brain that I used in my selection of lights were:

https://theconversation.com/does-colour-really-affect-our-mind-and-body-a-professor-of-colour-science-explains-84382

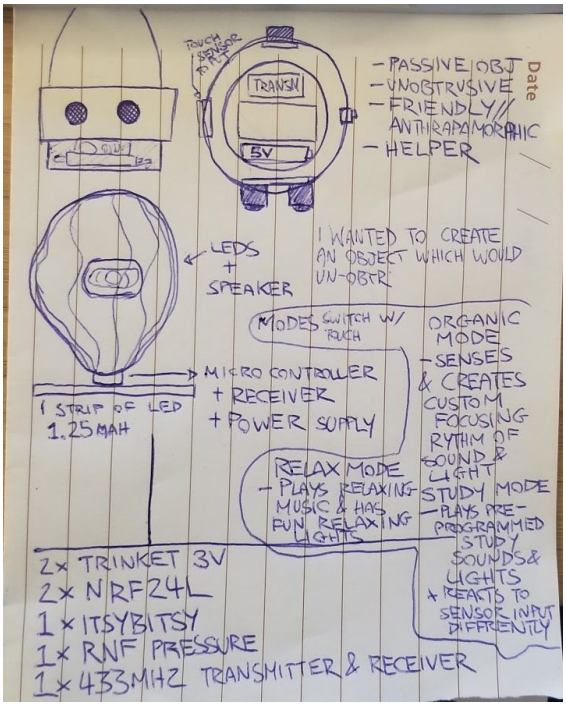
https://www.funderstanding.com/brain/your-brain-on-color/#:~:targetText=It's%20because%20of%20the%20impact,Biz%2C%20a%20branding%20blog%20reported.

http://brainbasedbiz.blogspot.com/2006/06/change-comes-through-colors-that.html

I eventually settled on three colors that I would be primarily using: Blue, Green, and Red.

Next came the first prototype, my new idea was that I would have a way of adding input into the object which would then based on that sensor input change a display of lights which would be contained in a frame. I purchased a heart-beat sensor, and some ws8112 from spikenzie labs and borrowed an fsr pressure sensor from the sensor lab. I was able to create a working version of my prototype by using the fastLED library as my way of creating interesting effects and displays with the light. However it became very clear in the presentation of my prototype that the WHY? Of my device was still unclear to me, what was its function and why did it exist, how did the sensor data and the light display output something which was meaningful.

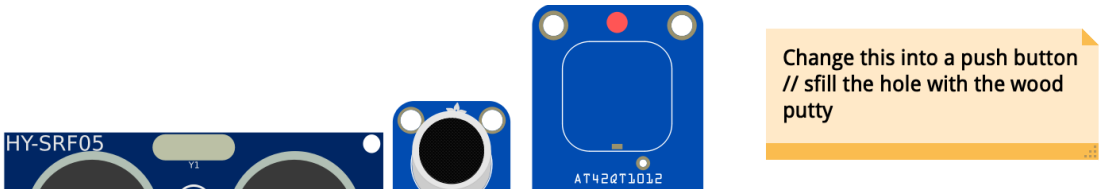
I was stuck on this question for quite some time, the meaning behind my object was still unknown to me. It came to me later when I was working away at my desk late in the night that I should refocus myself in a realm that I was comfortable in "myself" what would I want with a light display? The answer was that I would want a light display which would ideally help me focus or set the mood of the space I was in for whatever purpose I wanted. The key word that I became obsessed with was "ambient intelligence" this would become the heart of my final project, a device which would transform my work space and living space into a semi-intelligent space, capable of knowing where I was approximately and what was happening in that space again approximately.



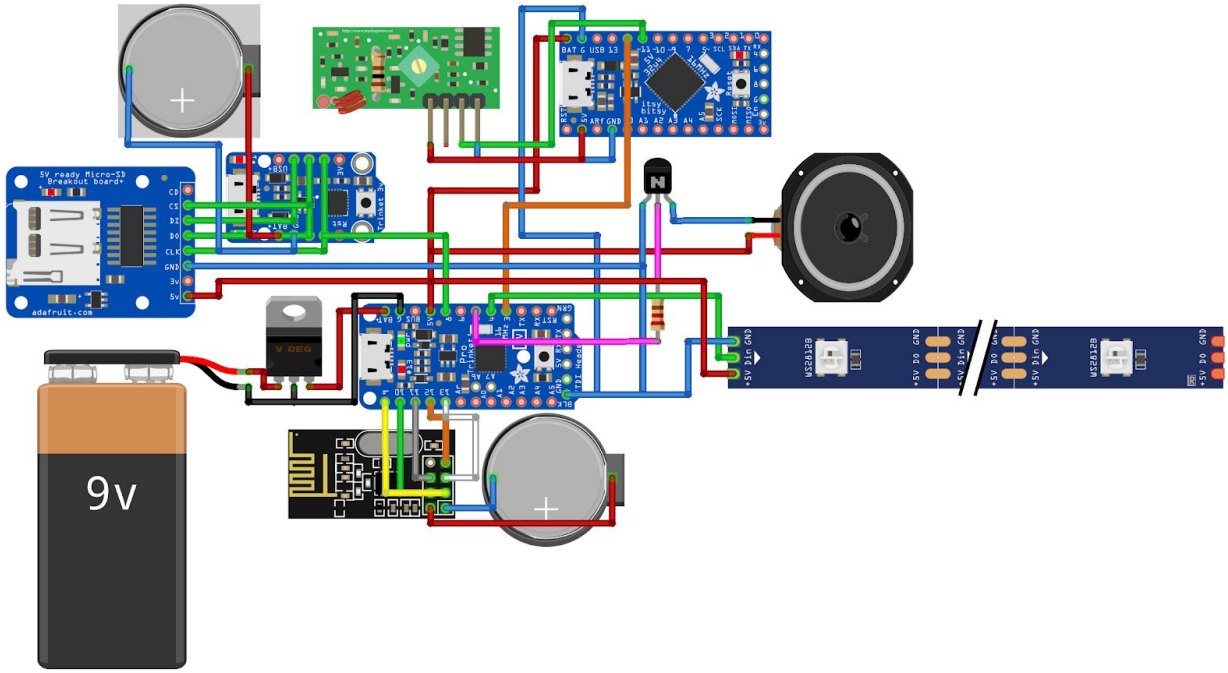
I did some research into what I would need to create the "eyes" and "ears" of my device. For the spatial data I would use SR-05 which could relay whether I was nearby or not, and for the acoustic data I would use a microphone. I also wanted to include a touch sensitive button to allow for a degree of manual control but it broke down and I took it as a sign that I should desist and focus on the functionality of my other sensors instead (so much for that). Another aspect of my project which may have turned out to have been the Achilles heel of my endeavor was the wireless aspect of everything. To me having a wireless quality to this network of machines would remove boundaries of the magic I was trying to make from the wired space of the machine to the locality of the whole room it lived in, making the experience all the more meaningful.

Finally we come to the final project which is documented in full below. It is two parts: an at desk eyes and ears module, and an on the wall bulging LED light & Sound projector.

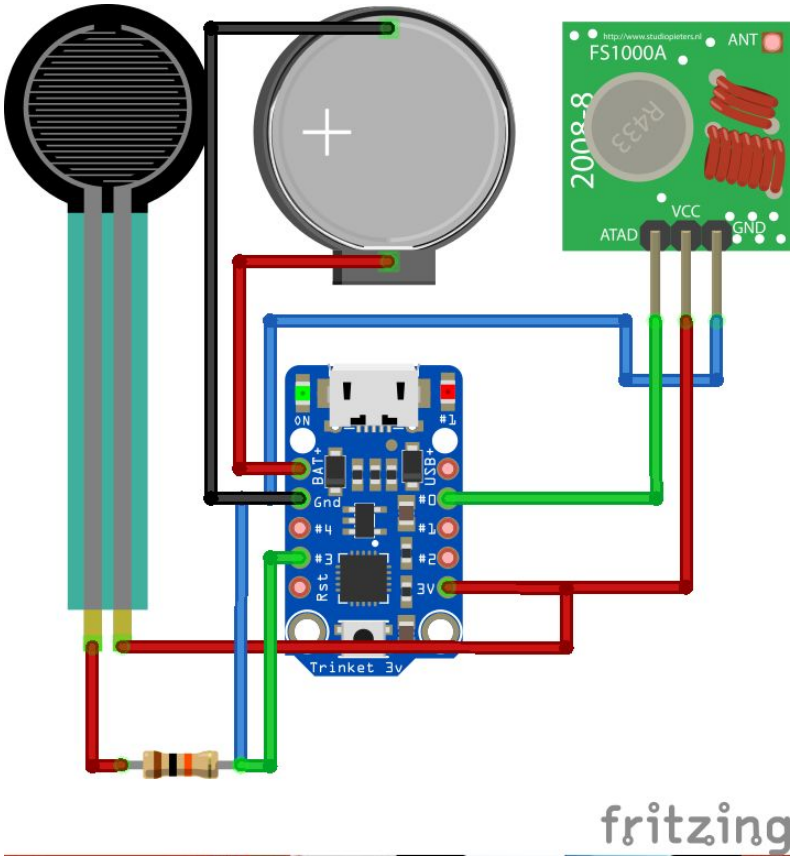
SCHEMATICS:
Eyes and ears module V.1



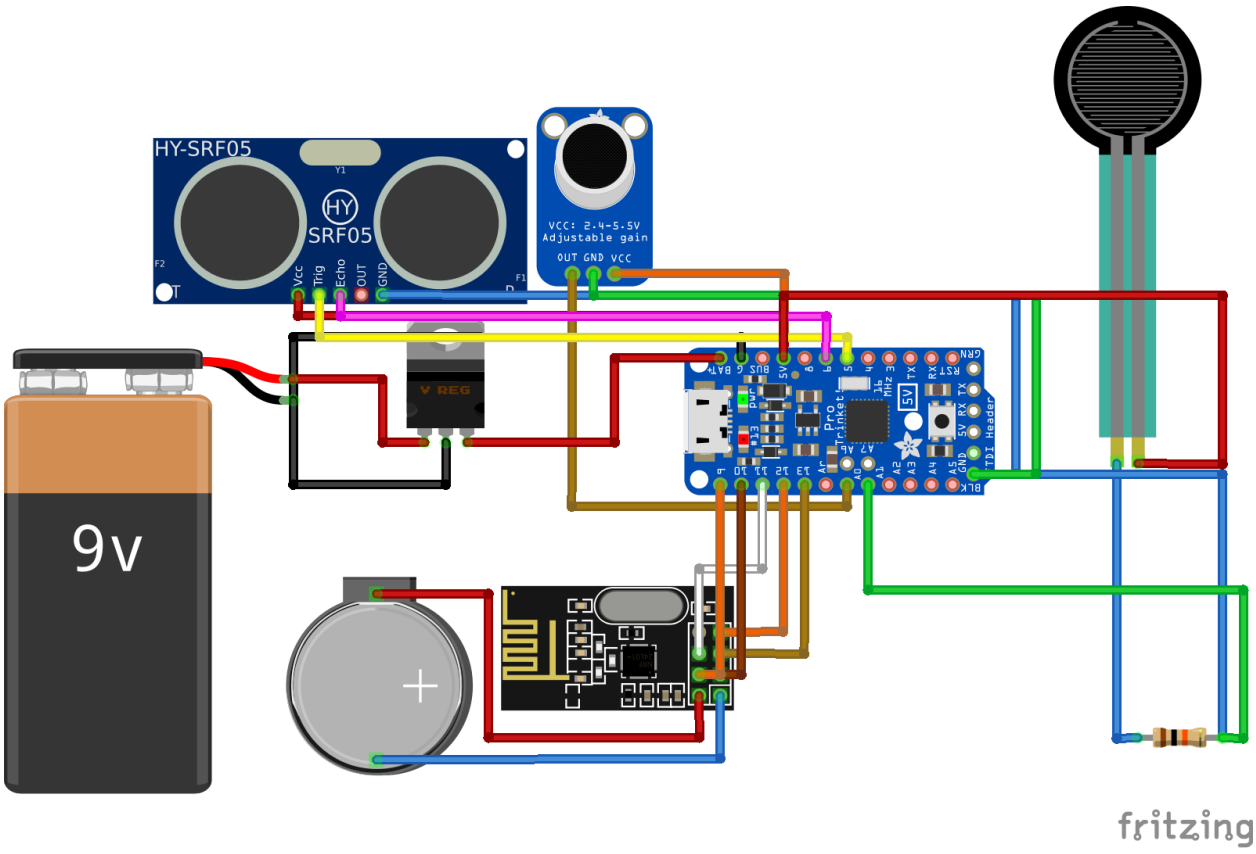
Light and Sound Projector V.1



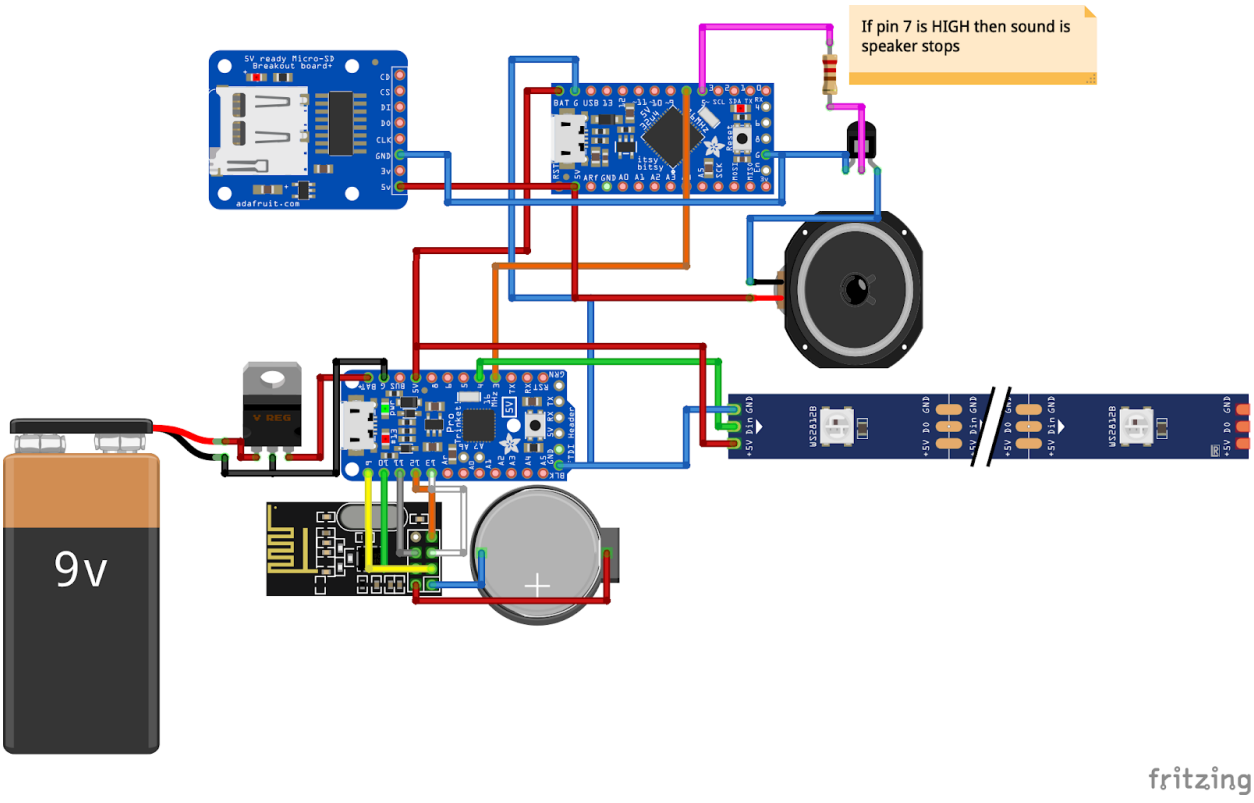
Poop_emjoi module V.1



Eyes and ears module V.2



Light and Sound Projector V.2



INSIGHTS AND FUTURE DEVELOPMENT:

I would like to in the (near) future get this up and running, that is goal number one. However there are a few others, before I get to those though I would like to dwell on the insights I've gained through this design process. First off is the principle of prototyping, although this was ingrained in us early on in the class, I only really came up with my idea in the last three weeks leaving me very little time to go from prototyping to full fledge implementation. The value of iterative design over a long enough period of time is invaluable, it allows us to figure out what's working, what's completely broken (my trinkets 3v) and to work through these issues. I wouldn't be in the situation I am currently in had I done more prototyping and worked through maybe 5 version of the current circuitry I am running. Another valuable insight I've gained is the principle of scope, I think when it finally came to putting the nose to the grindstone the idea I had in mind was much too large, much too complicated for my skill level. I had unrealistic ideals in mind, a lesson which I should have learnt after my meeting with Elio over my initial project proposal, I will going forward always ask myself if I am thinking realistically, or am I actually in the realm of the achievable with the time that is given to me. Another valuable insight I've gained, be mindful of time, most of my problems are things that could have been solved had I used the incredible amount of time given to us efficiently, in this case it isn't that I left the entire project to the last minute but rather that with little time left, I drastically changed the composition of the project meaning there was a lot of work that had to be done in a very short amount of time. I think this whole project has been a massive learning experience on what it takes to bring a project to completion, while that task in itself is already a very complex undertaking the minutiae and myriad of problems that arise in the making, creating and prototyping truly makes up the bulk of the work. In the future I will be more mindful of this, and many more insights I've gained through this disastrous failure. In terms of where I'd like to take this project in the future (besides making it work), implementing a wider range of small and discrete sensors in the space would help enrich the

smart space idea. Already we see smart homes and conscious rooms as being something less sci-fi and more of incoming innovation and exploring the different varieties that future might look like would be very interesting to me. I would also like to explore more meaningful interactions/outputs, currently sound and light are my two forms of this, however I think that these are perhaps too discreet or insufficient, there's a lot of room to play with (pardon the pun) but when it comes to space that is conscious of its tenant I think things like LED displays or self activating kettles for tea are possibilities. I'd like to remain within non-distracting outputs, things that slip into our everyday lived experiences, it would take some studying of how I use my space to see in what other directions could I slip in the intelligence of my space. Overall, I'm disappointed in myself, both for having not lived up to the extended deadline but also because I feel as if I've rushed the production of this, I see very clearly where I went wrong and now know all too well when I should have drawn a hard line. I can only try to do better in the future and to hopefully avoid having to relearn these lessons.

DOCUMENTATION:
EYES & EARS MODULE NEXT TO LIGHT AND SOUND PROJECTION

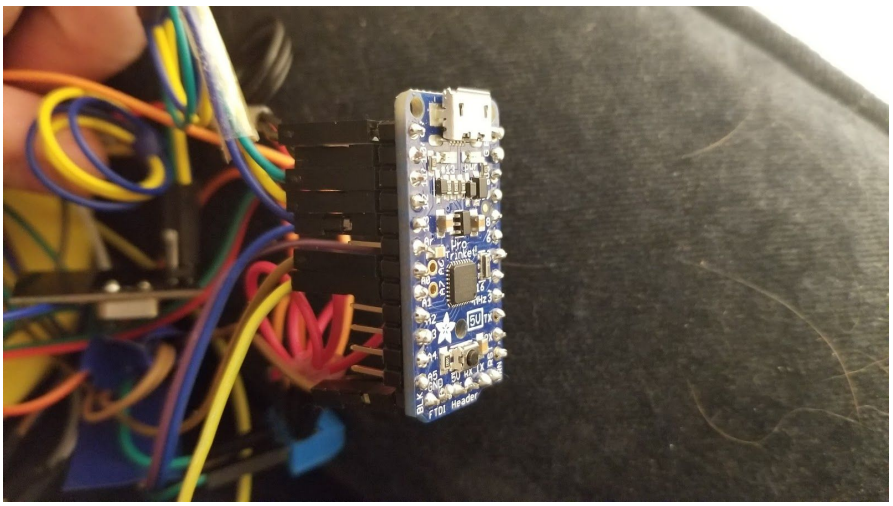
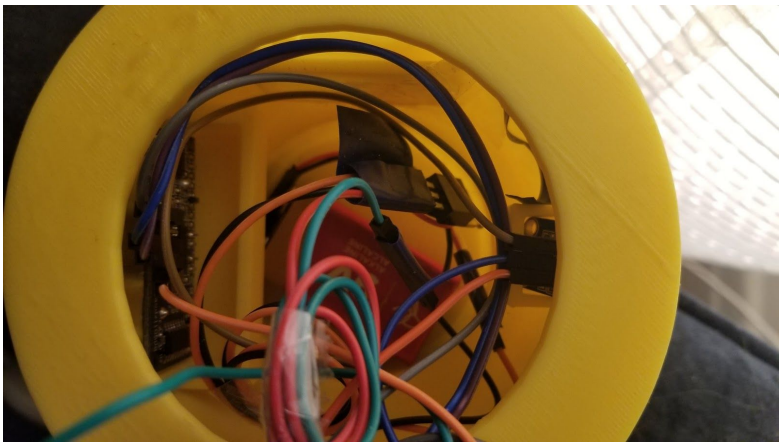
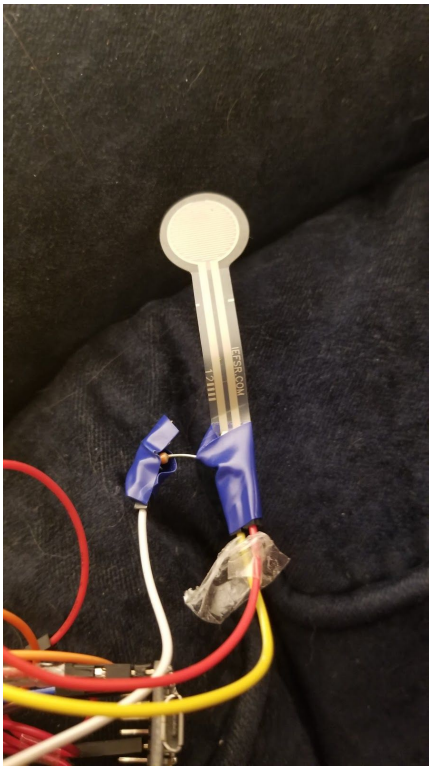


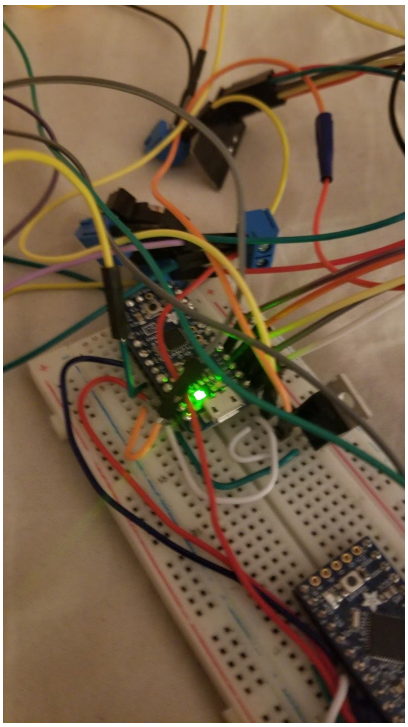
IMAGE OF CONNECTED PRO TRINKET 5V

INSIDE MY 3D PRINTED EYES AND EARS MODULE



CONNECTED FSR SENSOR

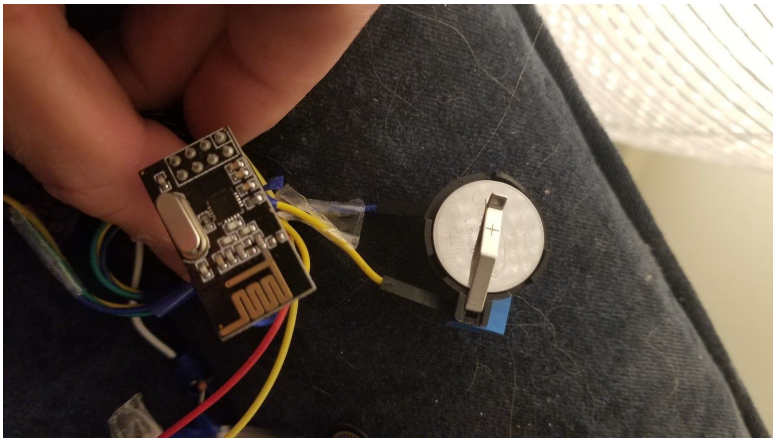




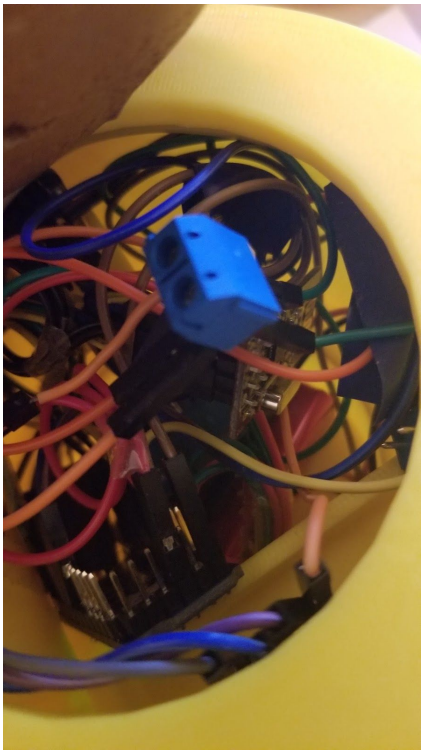
MAIN CONTROLLER OF LIGHT AND SOUND PROJECTOR CONNECTED PRO TRINKET 5V

POOP EMOJI STRESS BALL (FSR SENSOR GOES IN HERE)

NRFLO1 CONNECTED TO 3V BATTERY (ONE IN BOTH MODULES)



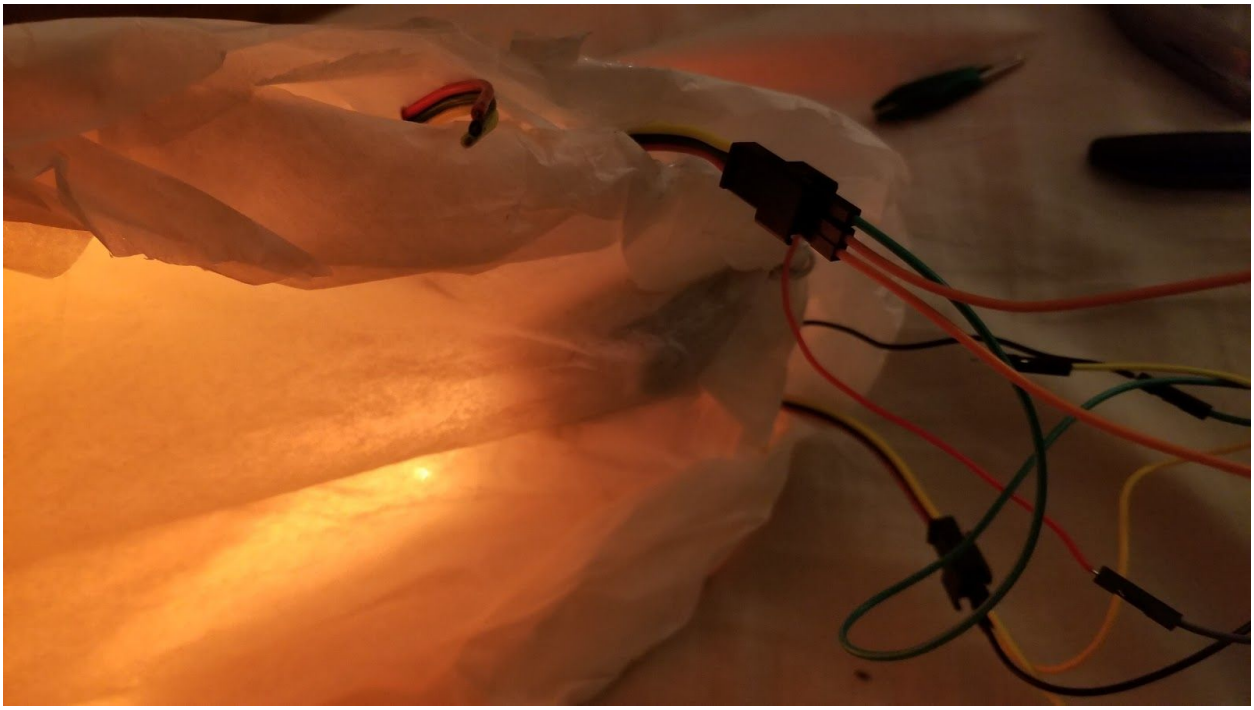
CLEANED UP EYES AND EARS
W/ FSR POOP_EMOJI



INSIDE EYES AND EARS MODULE

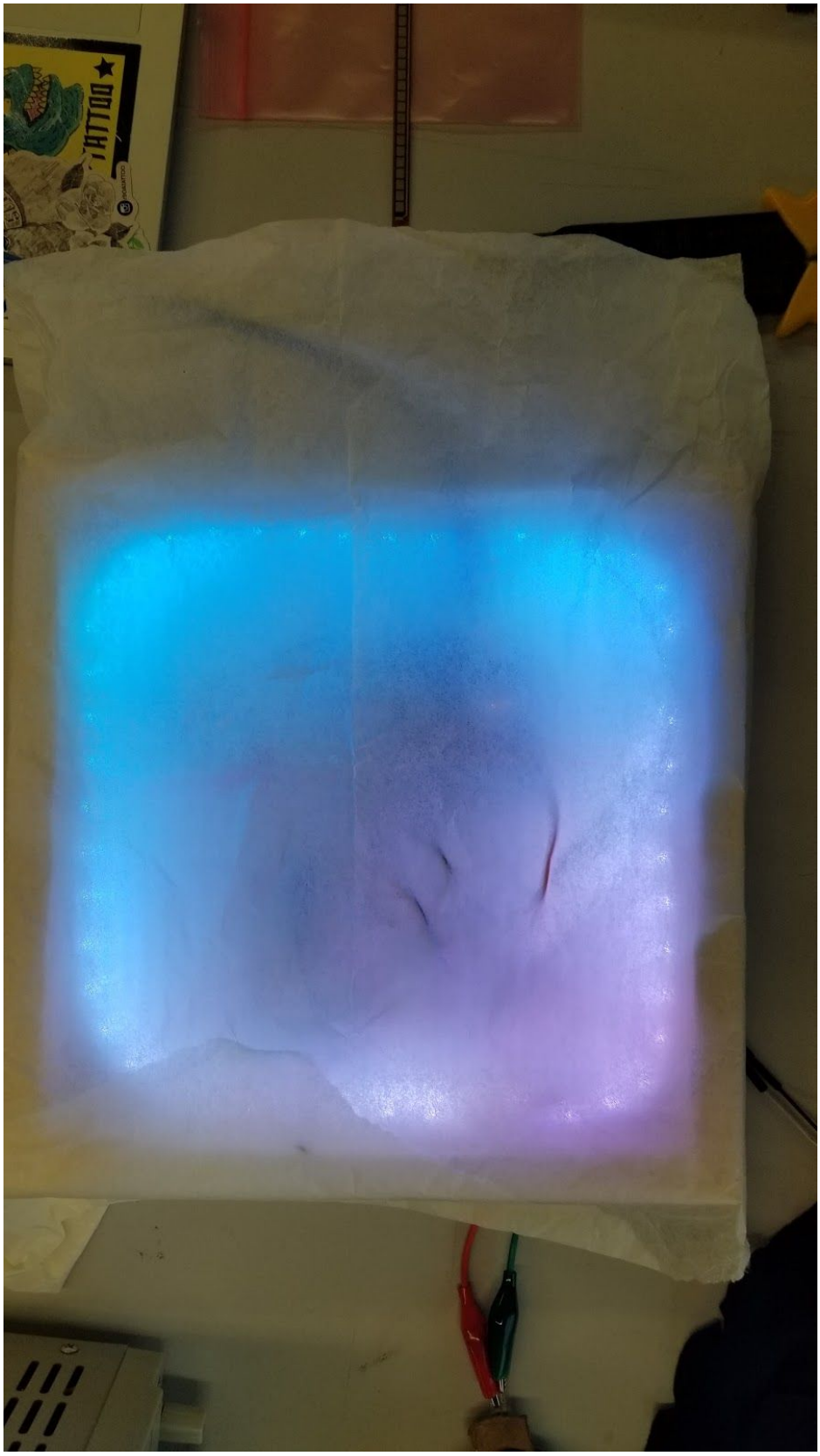
SEMI-FUNCTIONAL LIGHT AND SOUND PROJECTION

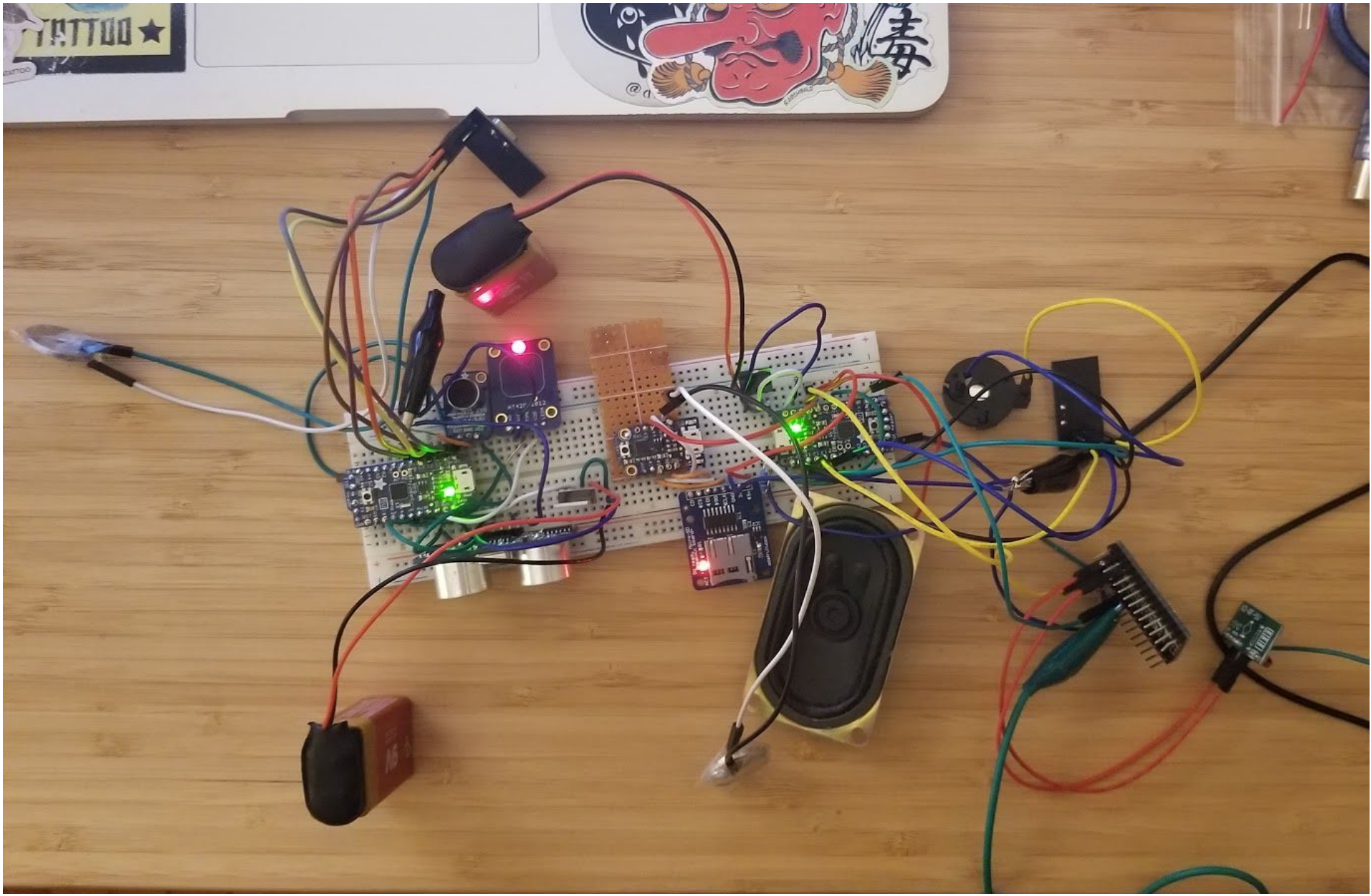
LED CONNECTIONS OF LIGHT AND SOUND MODULE

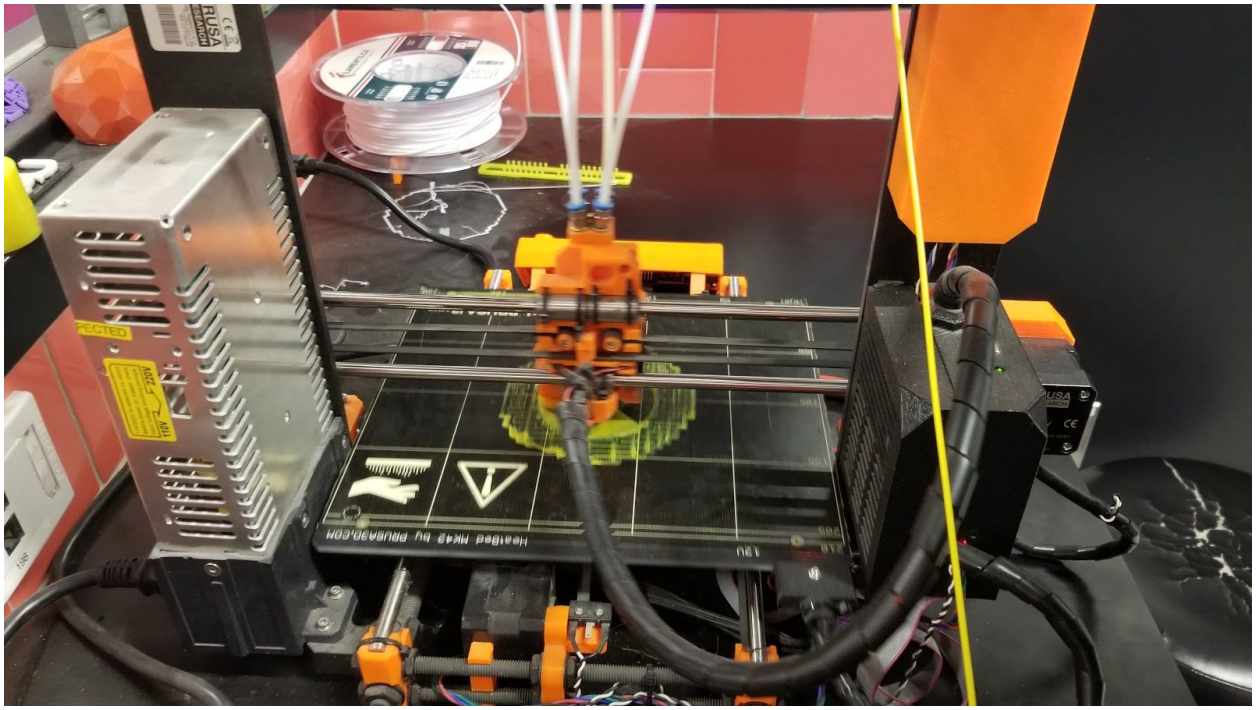


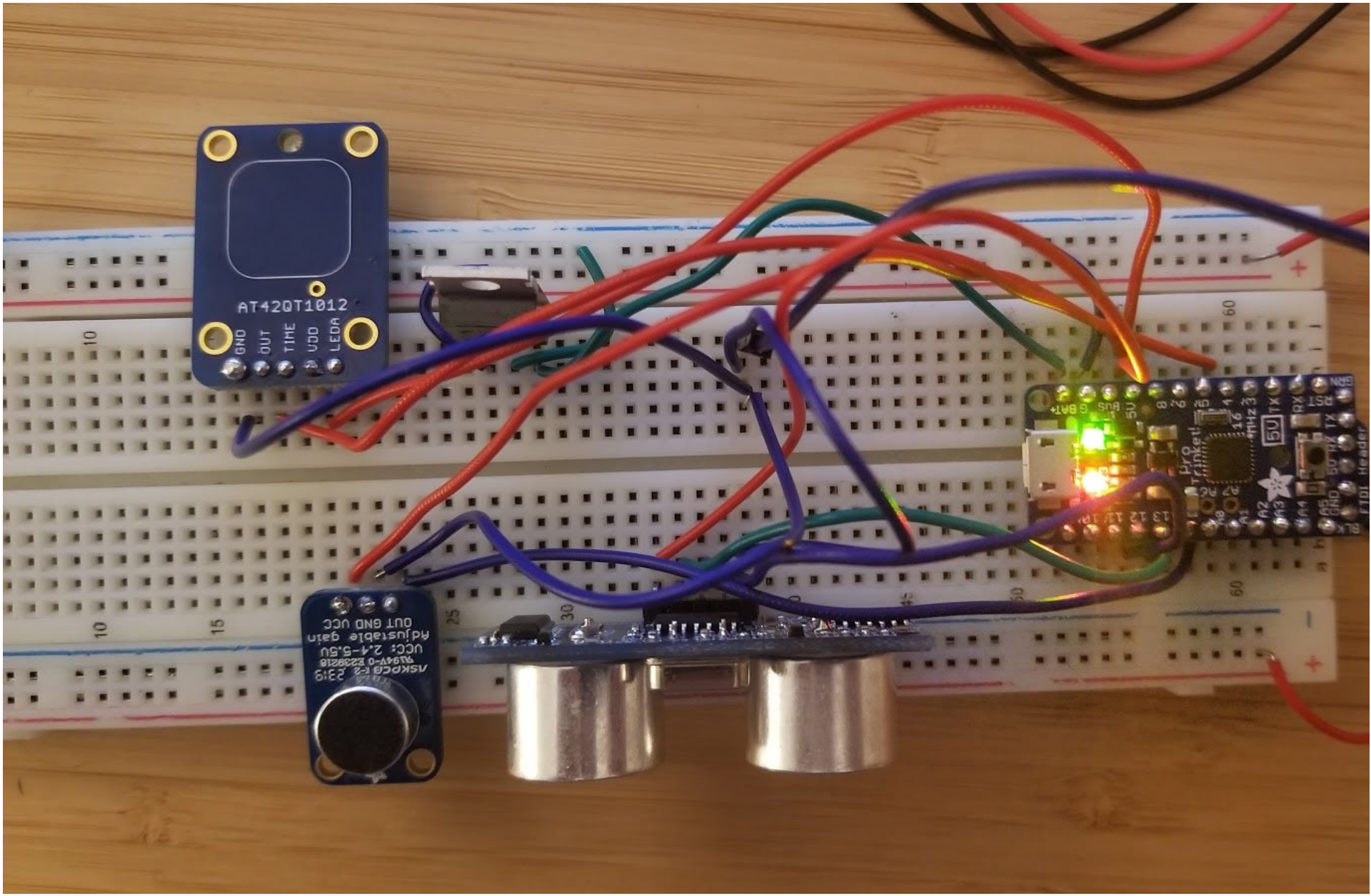
CLOSE UP OF LIGHT AND SOUND MODULE MOUNTED ON WALL

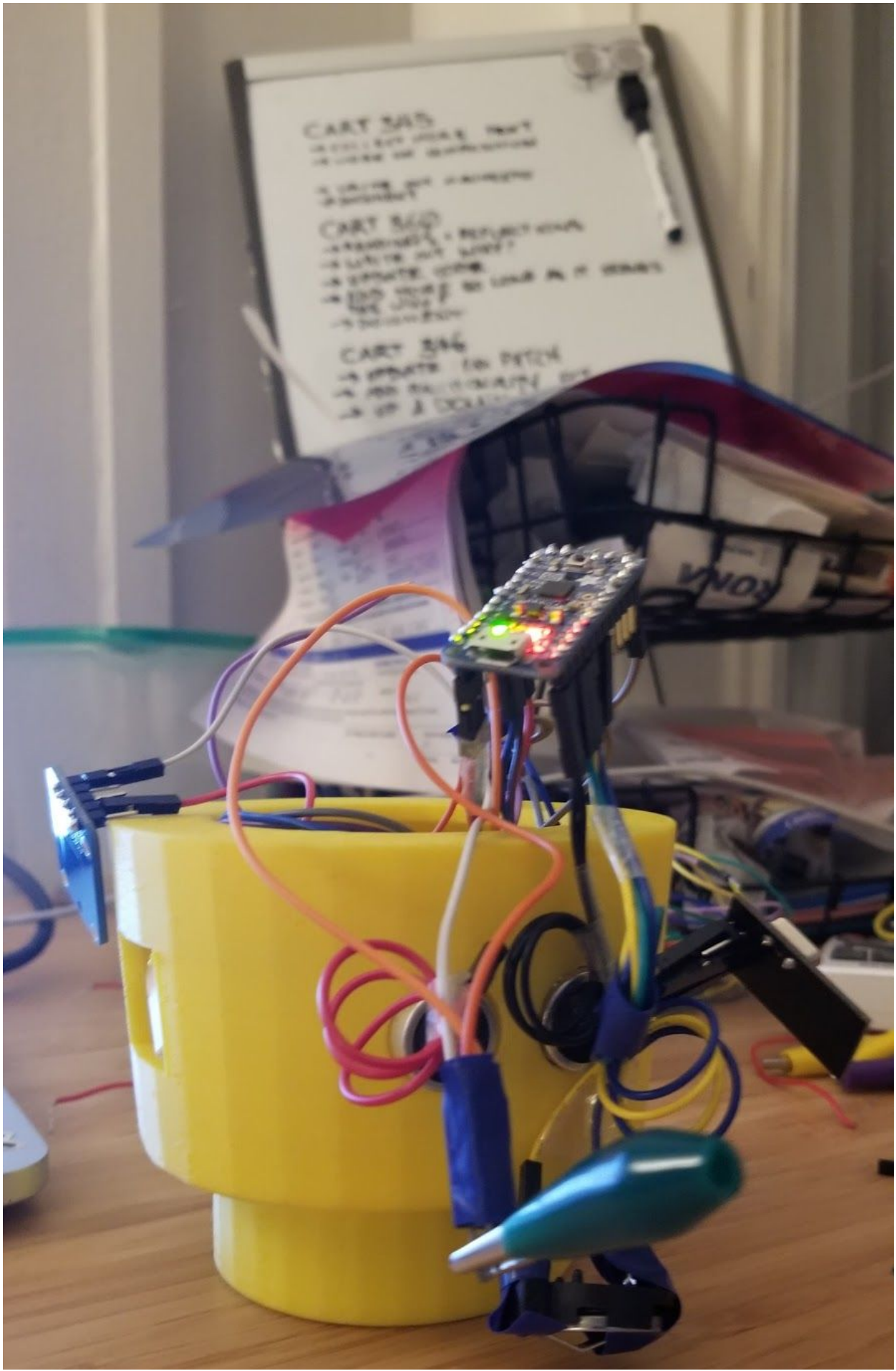
ASSORTED IMAGES OF WORK IN PROGRESS:

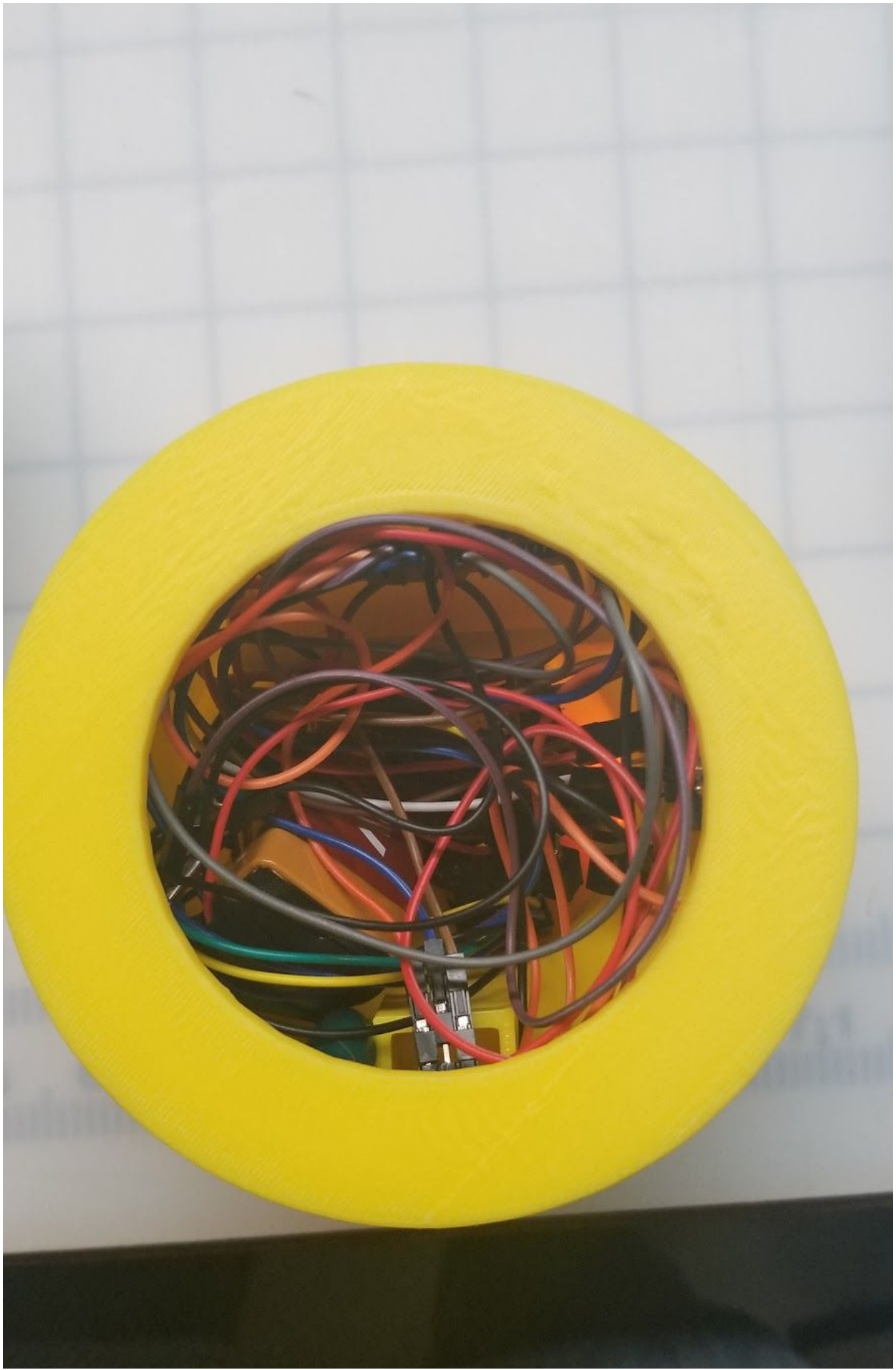


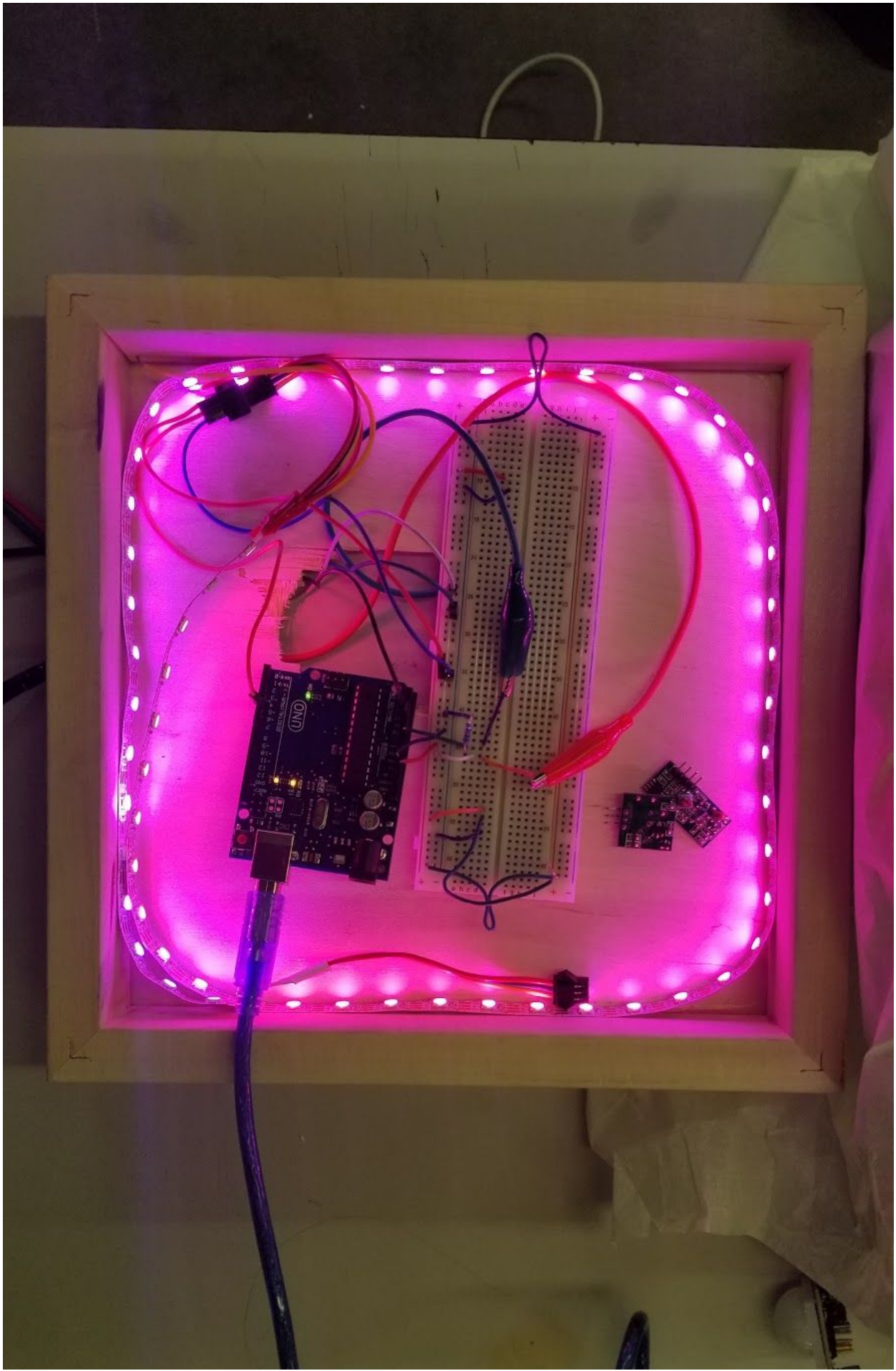


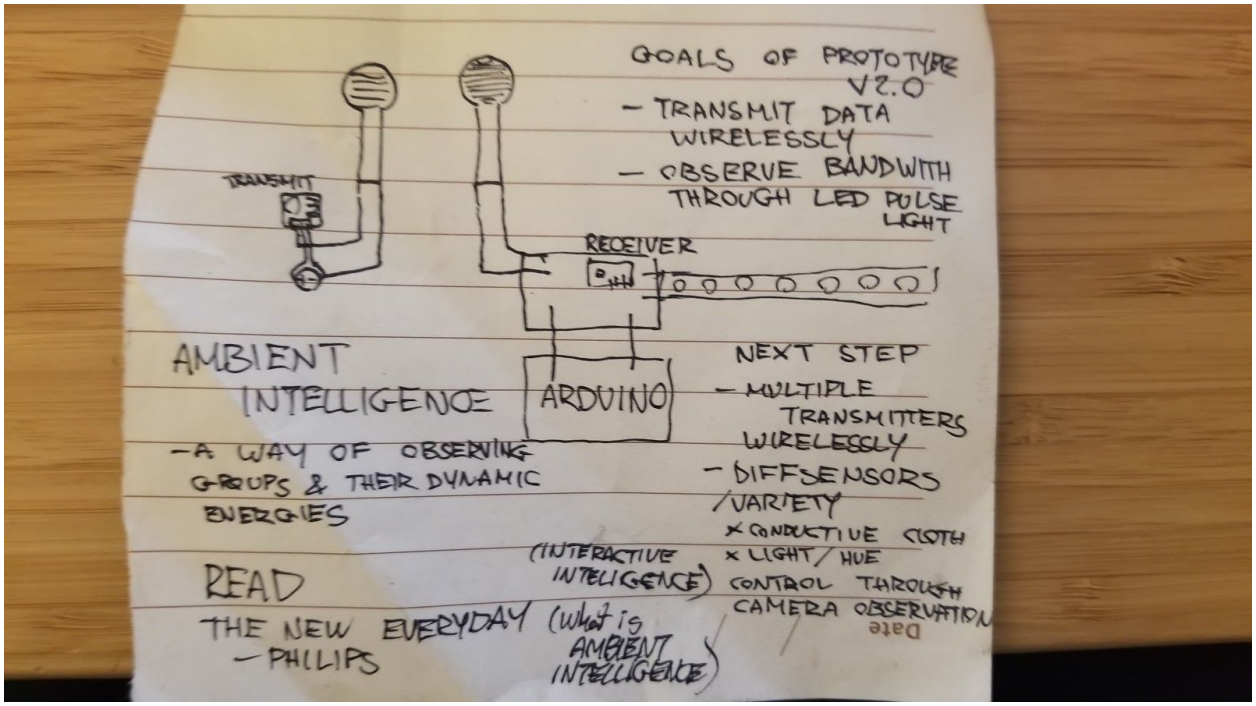


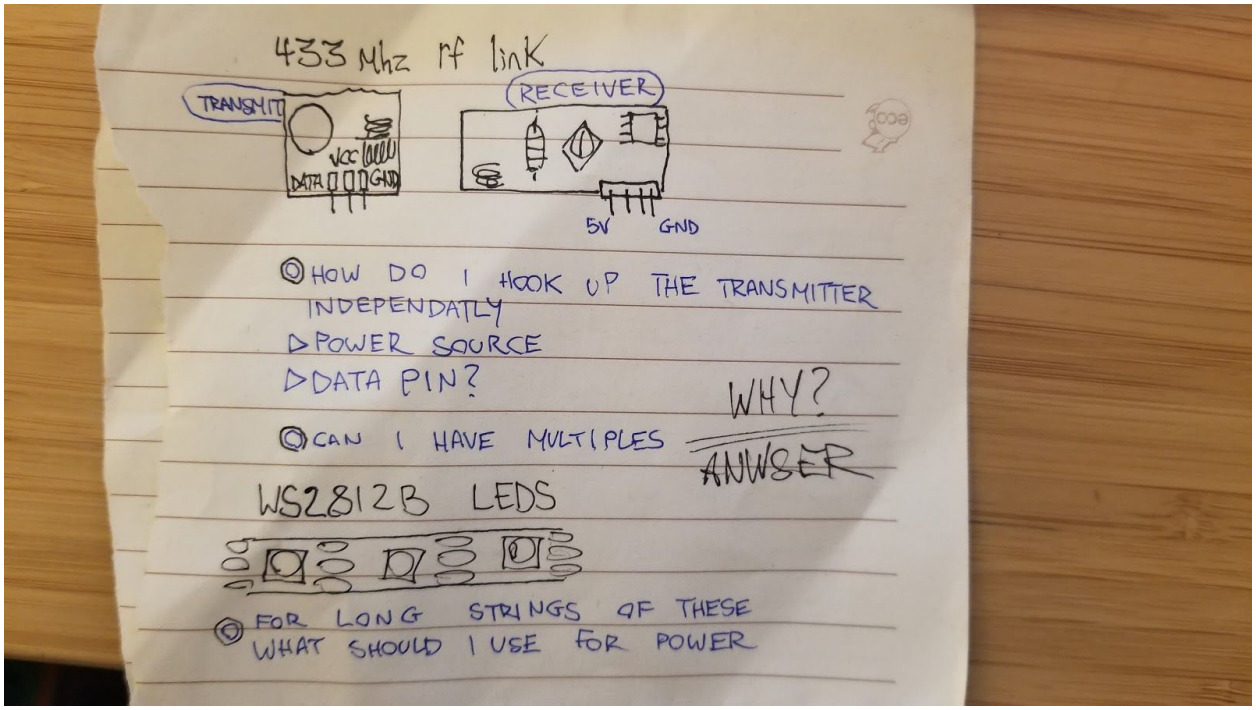

AT42QT1012
GND
OUT
TIME
VDD
LEDA
Adjustable gain
OUT GND VCC
VCC: 2.1-5.5V

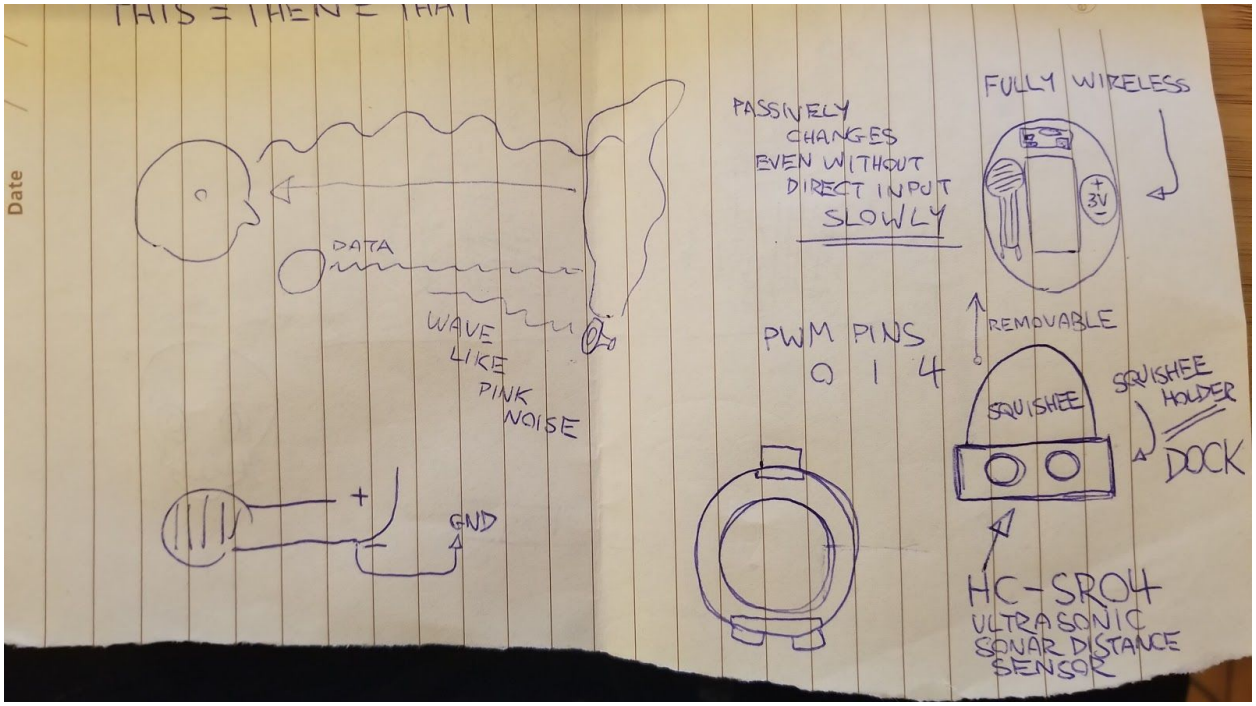

CART 345
CART 360
CART 346






GOALS OF PROTOTYPE V2.0
- TRANSMIT DATA WIRELESSLY
- OBSERVE BANDWITH THROUGH LED PULSE LIGHT
TRANSMIT
RECEIVER
ARDUINO
AMBIENT INTELLIGENCE
-A WAY OF OBSERVING GROUPS & THEIR DYNAMIC ENERGIES
READ
THE NEW EVERYDAY
-PHILIPS
(INTERACTIVE INTELIGENCE)
(what is AMBIENT INTELLIGENCE)
NEXT STEP
- MULTIPLE TRANSMITTERS WIRELESSLY
- DIFFSENSORS /VARIETY
x CONDUCTIVE CLOTH
x LIGHT / HUE
CONTROL THROUGH CAMERA OBSERVATION
Date


433 Mhz rf link
TRANSMIT
VCC
DATA
GND
RECEIVER
5V
GND
HOW DO I HOOK UP THE TRANSMITTER INDEPENDATLY
▷POWER SOURCE
▷DATA PIN?
CAN I HAVE MULTIPLES
WHY?
ANWSER
WS2812B LEDS
FOR LONG STRINGS OF THESE WHAT SHOULD I USE FOR POWER


THIS = THEN = THAT
Date
DATA
WAVE LIKE PINK NOISE
+
GND
PASSIVELY CHANGES EVEN WITHOUT DIRECT INPUT SLOWLY
PWM PINS 0 1 4
FULLY WIRELESS
3V
REMOVABLE
SQUISHEE
SQUISHEE HOLDER
DOCK
HC-SR04 ULTRASONIC SONAR DISTANCE SENSOR