University of Florida
EGN 2020C Engineering Design and Society
Team 09

EGN2020C
Class # 25788
Fall 2021
Dr. Villanueva
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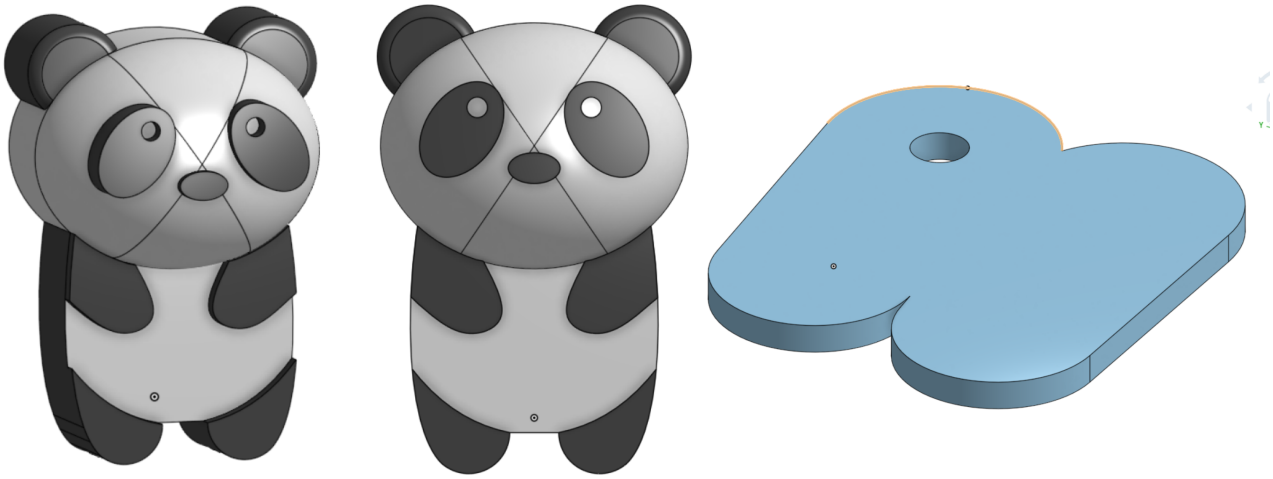
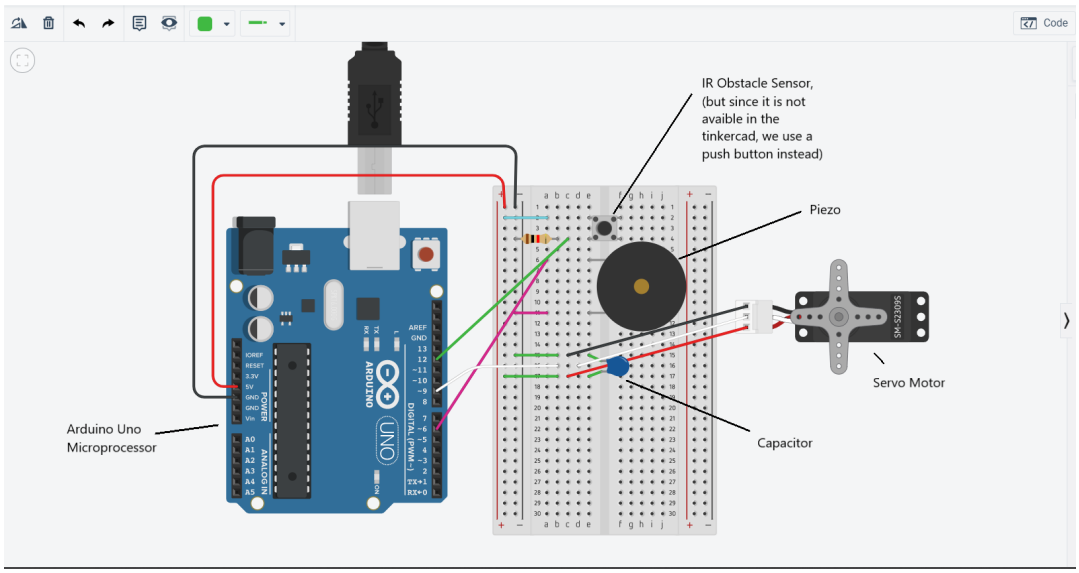
Dr. Panda: Character Soap Dispenser





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Human-Centered User Needs

An issue a lot of families have each year during flu season is getting kids to practice good hygiene, such as proper hand washing. For example, many children forget or even refuse to wash their hands after playing outdoors. Many parents tire from repeatedly instructing their kids to wash their hands and worry about the spread of illnesses during the holiday season. Inspired by these needs, we created a goal to help get children excited to wash their hands for their safety. We decided on a soap dispenser that is more kid friendly. The soap dispenser is shaped like a children's character to get children to remember to wash their hands. In addition, a twenty second song will play after soap has been dispensed so kids wash their hands for the full time. The Character Dispenser has a motion sensor to prevent any unnecessary contact and the spread of germs. By making it automatic this increases the ease of use which is something that the user wants since they do not want to spend extra time out of their busy schedules to utilize the product. Also, kids would need help from their parents if the product is difficult to utilize which makes it inefficient. While this dispenser may not be portable, many preschools can implement these devices to help stop the spread of COVID 19, influenza and other illnesses. The dispenser itself will be quite small and should fit into one cubic foot. Either a motion sensor or a temperature sensor (if a motion sensor is unavailable) will be used to detect a human's presence. The piezo and vibration motor are used to make the sounds and release the soap. As the design is planned to be quite small, it should be printed in less than eight hours. It will be programmed to vibrate (to release soap) and piezo to vibrate/sound once the sensor is activated.

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CUSTOMER EMPATHY MAP

Identify your customer and create a great product, service or design.
Learn more at https://conceptboard.com/blog/create-a-...

What does the person Think & feel?

What really counts
Major preoccupations
Worries & aspirations

I do not want to get sick.

Parents are worried their kids do not care about hygiene.

Kids think hand-washing is boring and tedious.

Worried

Afraid

What does the person Hear?

What friends say
What boss says
What influencers say

Children refusing to clean their hands by crying.

Children Complaining

Children coughing and sneezing

News about rise in COVID and flu cases.

Kids and family

What does the person See?

Environment
Friends
What the market offers

Children playing outside and getting dirty.

Boring soap

Sick Children

Products that require to touch surfaces.

Products that cost too much and do not efficiently solve the problem.

Children forgetting to wash their hands.

Parents repeatedly lecture children on importance of hygiene.

They say washing their hands every time is boring.

What does the person Say and do?

Attitude in public
Appearance
Behavior towards others

They get home full of germs and spread it around.

Pain

Fears
Frustrations
Obstacles

Parents fear germs spreading making everyone sick.

Children getting sick and needing to miss school.

Parents fear getting sick hence not being able to go to work.

Most ways to get kids to wash hands are either ineffective or expensive

Gain

Wants/Needs
Measures of Success
Obstacles

Health

Kids no longer need to miss school.

They need a product that does not require touch.

They need a product that gets kids excited to wash their hands

A product that is efficient but does not break the bank.

Source: XPLANE.com

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Design Idea Generation and Justification

ATTRIBUTE (OR FACTOR)	List each attribute (or factor) you need to consider when deciding on the best overall solution or design.	Feasibility	Cost	Efficiency	Safety	Ease of use	Mass Producibility	SUMS
FACTOR (OR ATTRIBUTE) PRIORITY MULTIPLIER	On a scale of 1 to 10, where ten is highest and one is lowest, rate the priority you should give for the factor (or attribute) above.	7	9	10	8	9	6	
Design	Design Ideas	DESIGN IDEA WEIGHT: On a scale of 1 to 10, where ten is the highest and one is the lowest, rate your design idea.						
A	Automatic Character Soap Dispenser	10	8	8	9	10	9	438
B	Automatic Door Handle Cleaner	8	7	9	9	10	8	419

Our group decided on the automatic character soap dispenser. Our most valued feature was efficiency, as that is the main goal of the product. Despite the selected idea scoring lower in efficiency, we decided to go for it because of its better scores in other categories that suit the user. Namely, we wanted the product to be cheap enough so people could buy it, and we needed the product to be feasible to create and mass produce, allowing for this solution to make a bigger impact, and possibly make the product cheaper. Additionally, this still scored high in the categories of safety and ease of use, which are highly important for users, as they would not want a product that is difficult or dangerous. This also needs to fit the given constraints of the project. For example, the soap dispenser can very well fit within one cubic foot. Ideally, this product will use a motion sensor to prevent contact and the spreading of germs. If a motion sensor is not readily available, a temperature sensor (or other sensor) can be used in its place. When we compared the automatic door handle cleaner and the automatic character soap dispenser the automatic soap dispenser was a better fit. The soap dispenser is very efficient since it is fast and it does not require any extra assembly steps. While the door handle cleaner is efficient it is not as appealing to children. The character soap dispenser is intended to target children which was our goal for the final product design. Cost was also a big thing we considered because since the automatic door handle takes more materials to produce and has complex technology the cost is significantly larger. Overall, taking all these things into consideration the user will have a product that is reasonably priced, is efficient, and is easy to use without needing any contact; hence, meeting their needs.

Ethical & Environmental Considerations

In terms of environmental considerations, our materials can be reused. The shell of the product is made from plastic and cardboard, which provide an alternative to being trashed. While only the cardboard is recyclable, the front plate plastic is biodegradable (over a long time). For the inside, there is a soap dispenser that is also made of recyclable plastic and there also electronic components, such as the breadboard and metallic wires. In the case that the product breaks down, it is likely only one component that is faulty; the one part can be replaced or the non-broken circuitry parts could be donated to be reused in other projects. One final consideration is how the soap bottle inside the dispenser is refillable. By doing this, we give an option for consumers to buy soap refills in bigger sizes, allowing them to cut back on consistently buying small bottles that contribute to harmful waste.

In terms of ethical considerations, we sourced our materials and built the project ethically. Notably, we ensure that the product is created from ethical sources. The plastic was printed using PLA plastic which is made sustainably and from natural materials such as corn starch, or recycled materials, making it biodegradable. If this product were to go in mass production as we designed it to be, we would ensure ethical labor sourcing by intolerance of child labor, human exploitation, and outsourced labor with poor working conditions. Additionally, we considered the other side of the product with the user's safety. For instance, the electronic circuits are enclosed, so a child cannot access and possibly hurt themselves with the circuit. We have different compartments within the body to separate the electrical components with the soap in order to avoid them coming into contact and breaking the circuit. The plastic, furthermore, is non-toxic, which will prevent children from poisoning themselves if they potentially lick the plastic or use it incorrectly in another such way.

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Tinkercad Circuits User Manual

1. Build the circuit as shown below, excluding only the wires connecting the servo motor and the IR sensor to the board.

2. Attach the arduino and breadboard to a piece of cardboard roughly the size of the front face of the box.
3. Attach a printed trapdoor to a servo motor
4. Attach the bottom of the servo motor to the bottom of the container (cardboard box).
5. Attach the cardboard wall with the Arudino and a hole for a wire behind the servo motor to attach the Arduino board.
6. Cut a hole below the trapdoor to allow the soap to fall into one's hand.
7. Using a male to female connector, wire an infrared obstacle avoidance sensor module from the Arduino board to behind the hole from the previous step

8. Cut a board the width of the overall container

9. Add a hole to hold the soap container
10. Glue this soap container holder upside down so the lid of the soap container rests on the trapdoor (see photo).
11. Cut a hole on the top of the overall container to add soap in.
12. Add soap
13. Attach IR sensor to front wall pointing downward through the hole under the trapdoor., Add male to female wires, run through the hold in the cardboard wall, into the arduino
14. Attach the character to the front of the container
15. Place hand below the dispenser (near the sensor) to dispense soap

Maintenance:

1. Whenever the soap runs out, open the tab on the top of the box and pour soap in to refill the container.

<u>Parts and Components</u>

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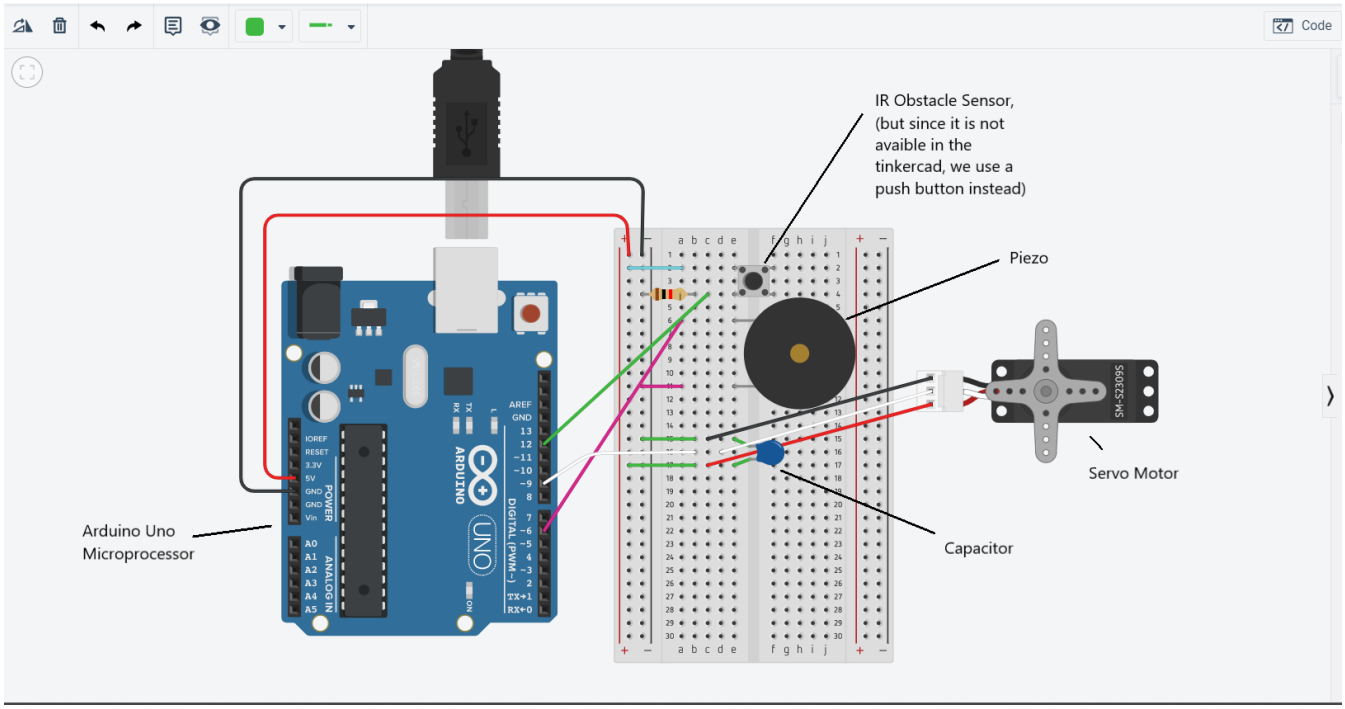
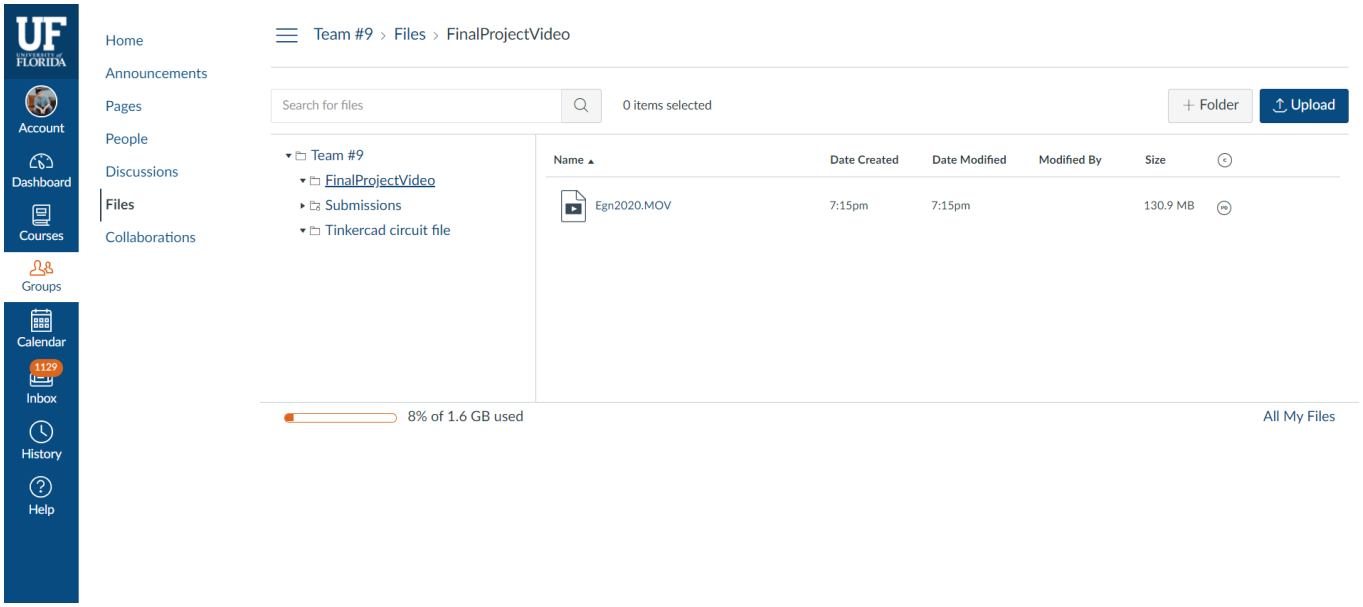


1. **IR Obstacle Sensor**, the component shown in the picture is a switch button because we cannot find the obstacle sensor inside the tinkercad parts library. It is used to detect obstacles, when an obstacle is present it will power on the piezo and the servo motor.
2. **Piezo**, convert electrical signals into mechanical vibration that will produce sounds and music.
3. **Servo motor**, used to turn the opening of the soap, so the soap can fall through.
4. **Capacitor**, 100uf capacitor will be used to smooth out any voltage changes that may occur.
5. **Arduino Uno Microprocessor**, stored the instruction for running the circuit.

Tutorial Video
Video Link: https://youtu.be/4uq-C7013QA



The final video file can be find in our group file, Team #9, under the folder FinalProjectVideo.

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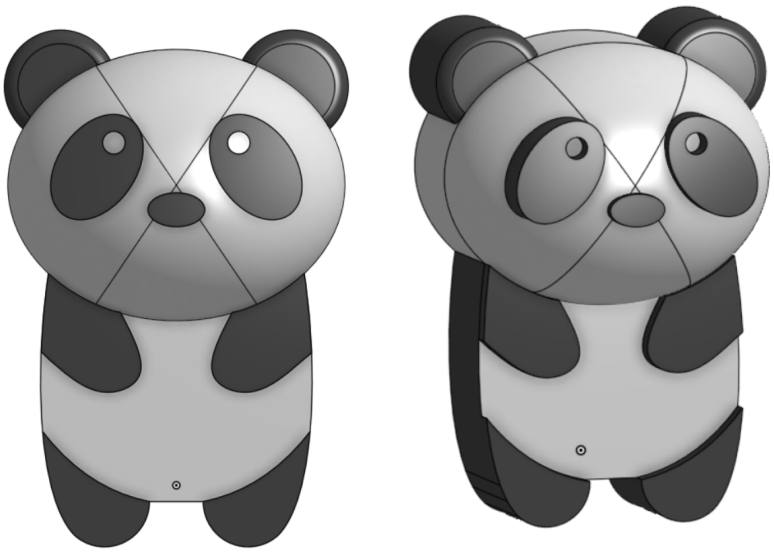
Engineering Drawings

What the panda would be like had we had more than 8 hours to print:



This is the original, three-dimensional version of the panda that we would use in our ideal design (if we were building a prototype without material limitations). While this covers the same design-oriented function as the 2-D version does, it also is hollow to serve as the entire body of the soap dispenser. The depth would allow us enough space to fit the circuit and components inside.

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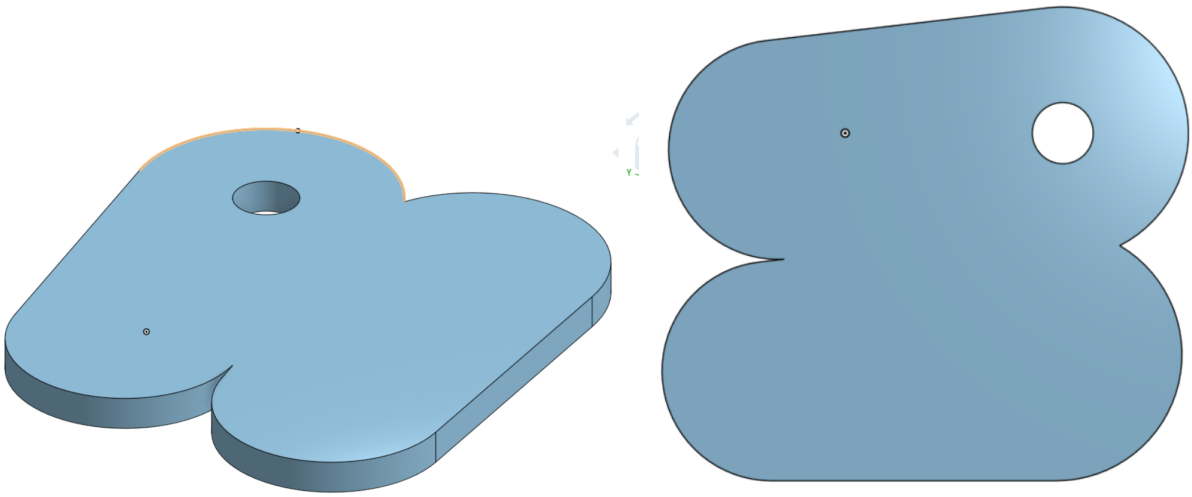
The 3D models that were used as part of the prototype:

This is the front part of the prototype that appeals to kids with a fun character like the one above: Dr. Panda. The part is made up of extrusions that come together to make a flatter version of the panda that could be printed in adequate time. The function of this part in the overall design is to be one of the main appealing factors for kids when they wash their hands.



These two figures show the 3D printed object for the trap door we use to open and close the hand soap opening. The trap door is hot glue to the servo motor, thus when the motor turns the trap door will turn with it. At the resting stage, the trap door will seal off the bottle opening, and when the motor turns it will turn toward the side with the hole allowing soap to fall.

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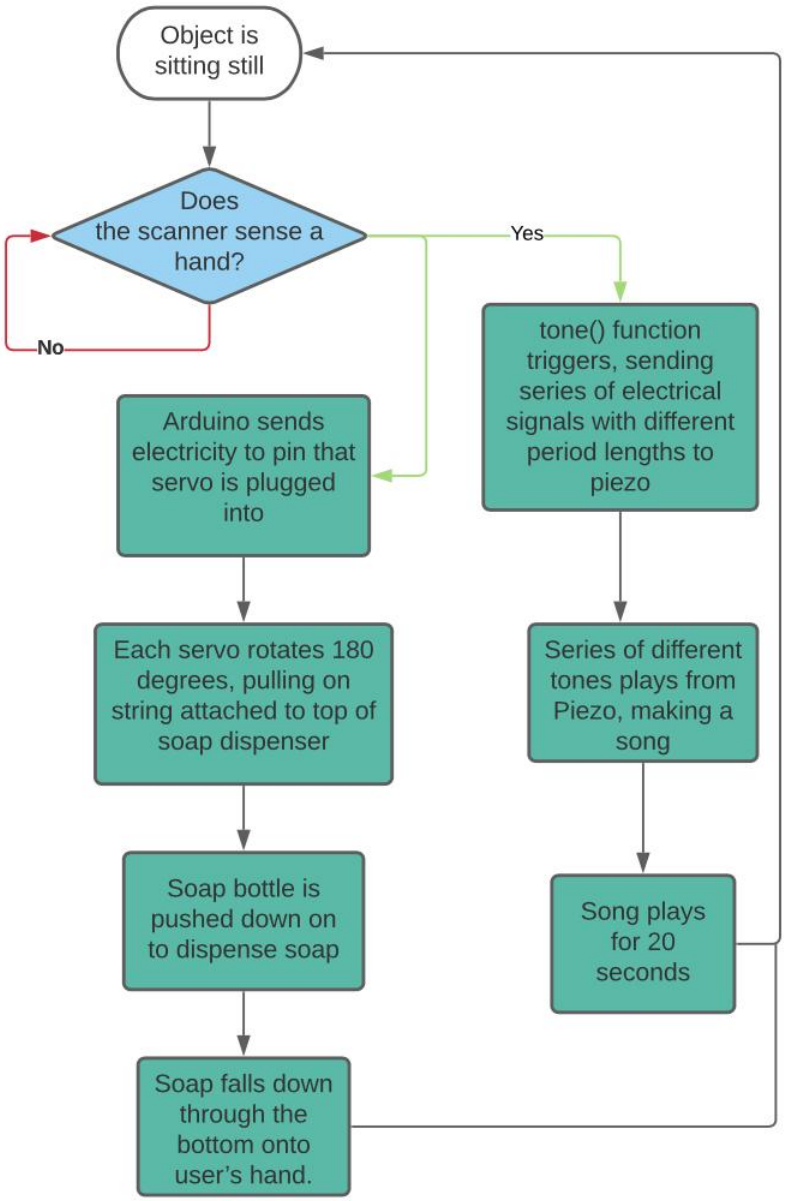
Flowchart



Our flowchart depicts the interaction between the Arduino board and the actuators within the project. The initial state will always be stationary as the dispenser always waits to be used again, so the flowchart loops around to the beginning. In the initial state, the Arduino waits to get a signal from the sensor, which triggers two actuators, the motor and the piezo. Both receive signals from the Arduino: the motor turns to pull the string attached to the soap bottle and the

piezo plays a series of beats. The outcome is that soap is poured into the user's hand and a song plays for twenty seconds.

Programming Code with Comments

```
/* Define the note needed for the song "Take On Me" */
#define NOTE_B0  31
#define NOTE_C1  33
#define NOTE_CS1 35
#define NOTE_D1  37
#define NOTE_DS1 39
#define NOTE_E1  41
#define NOTE_F1  44
#define NOTE_FS1 46
#define NOTE_G1  49
#define NOTE_GS1 52
#define NOTE_A1  55
#define NOTE_AS1 58
#define NOTE_B1  62
#define NOTE_C2  65
#define NOTE_CS2 69
#define NOTE_D2  73
#define NOTE_DS2 78
#define NOTE_E2  82
#define NOTE_F2  87
#define NOTE_FS2 93
#define NOTE_G2  98
#define NOTE_GS2 104
#define NOTE_A2  110
#define NOTE_AS2 117
#define NOTE_B2  123
#define NOTE_C3  131
#define NOTE_CS3 139
#define NOTE_D3  147
#define NOTE_DS3 156
#define NOTE_E3  165
#define NOTE_F3  175
#define NOTE_FS3 185
#define NOTE_G3  196
#define NOTE_GS3 208
#define NOTE_A3  220
#define NOTE_AS3 233
#define NOTE_B3  247
#define NOTE_C4  262
#define NOTE_CS4 277
#define NOTE_D4  294
#define NOTE_DS4 311
```

```
#define NOTE_E4  330
#define NOTE_F4  349
#define NOTE_FS4 370
#define NOTE_G4  392
#define NOTE_GS4 415
#define NOTE_A4  440
#define NOTE_AS4 466
#define NOTE_B4  494
#define NOTE_C5  523
#define NOTE_CS5 554
#define NOTE_D5  587
#define NOTE_DS5 622
#define NOTE_E5  659
#define NOTE_F5  698
#define NOTE_FS5 740
#define NOTE_G5  784
#define NOTE_GS5 831
#define NOTE_A5  880
#define NOTE_AS5 932
#define NOTE_B5  988
#define NOTE_C6  1047
#define NOTE_CS6 1109
#define NOTE_D6  1175
#define NOTE_DS6 1245
#define NOTE_E6  1319
#define NOTE_F6  1397
#define NOTE_FS6 1480
#define NOTE_G6  1568
#define NOTE_GS6 1661
#define NOTE_A6  1760
#define NOTE_AS6 1865
#define NOTE_B6  1976
#define NOTE_C7  2093
#define NOTE_CS7 2217
#define NOTE_D7  2349
#define NOTE_DS7 2489
#define NOTE_E7  2637
#define NOTE_F7  2794
#define NOTE_FS7 2960
#define NOTE_G7  3136
#define NOTE_GS7 3322
#define NOTE_A7  3520
#define NOTE_AS7 3729
#define NOTE_B7  3951
#define NOTE_C8  4186
#define NOTE_CS8 4435
#define NOTE_D8  4699
```

```
#define NOTE_DS8 4978
#define REST      0

#include <Servo.h> //include the servo library in order to use the servo motor
Servo smotor; //declare servo motor object
//Set up constants for the pins used for input and output
int obstaclePin = 4;
int obstacle = HIGH; //high means no obstacle
int piezo = 6;
int tempo = 140; // change this to make the song slower or faster

// notes of the melody followed by the duration.
// a 4 means a quarter note, 8 an eighteenth , 16 sixteenth, so on
// !!negative numbers are used to represent dotted notes,
// so -4 means a dotted quarter note, that is, a quarter plus an eighteenth
int melody[] = {
  // Take on me, by A-ha
  // Score available at https://musescore.com/user/27103612/scores/4834399
  // Arranged by Edward Truong
  NOTE_FS5, 8, NOTE_FS5, 8, NOTE_D5, 8, NOTE_B4, 8, REST, 8, NOTE_B4, 8, REST, 8,
NOTE_E5, 8,
  REST, 8, NOTE_E5, 8, REST, 8, NOTE_E5, 8, NOTE_GS5, 8, NOTE_GS5, 8, NOTE_A5, 8,
NOTE_B5, 8,
  NOTE_A5, 8, NOTE_A5, 8, NOTE_A5, 8, NOTE_E5, 8, REST, 8, NOTE_D5, 8, REST, 8,
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NOTE_E5, 8,

  REST, 8, NOTE_E5, 8, REST, 8, NOTE_E5, 8, NOTE_GS5, 8, NOTE_GS5, 8, NOTE_A5, 8,
NOTE_B5, 8,
  NOTE_A5, 8, NOTE_A5, 8, NOTE_A5, 8, NOTE_E5, 8, REST, 8, NOTE_D5, 8, REST, 8,
NOTE_FS5, 8,
  REST, 8, NOTE_FS5, 8, REST, 8, NOTE_FS5, 8, NOTE_E5, 8, NOTE_E5, 8, NOTE_FS5, 8,
NOTE_E5, 8,
  NOTE_FS5, 8, NOTE_FS5, 8, NOTE_D5, 8, NOTE_B4, 8, REST, 8, NOTE_B4, 8, REST, 8,
NOTE_E5, 8,
  REST, 8, NOTE_E5, 8, REST, 8, NOTE_E5, 8, NOTE_GS5, 8, NOTE_GS5, 8, NOTE_A5, 8,
NOTE_B5, 8,

  NOTE_A5, 8, NOTE_A5, 8, NOTE_A5, 8, NOTE_E5, 8, REST, 8, NOTE_D5, 8, REST, 8,
NOTE_FS5, 8,
  REST, 8, NOTE_FS5, 8, REST, 8, NOTE_FS5, 8, NOTE_E5, 8, NOTE_E5, 8, NOTE_FS5, 8,
NOTE_E5, 8,
};
```
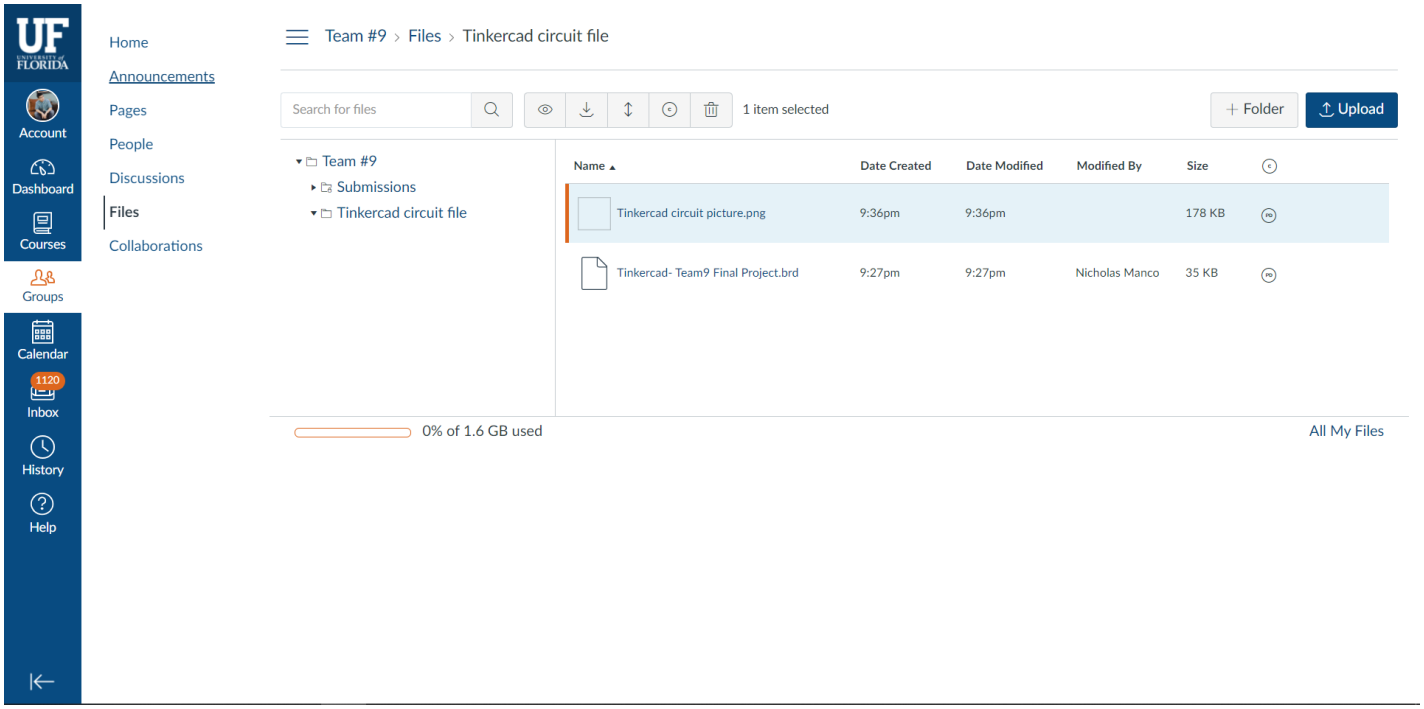

```
// sizeof gives the number of bytes, each int value is composed of two bytes (16 bits)
// there are two values per note (pitch and duration), so for each note there are four bytes
int notes = sizeof(melody) / sizeof(melody[0]) / 2;

// this calculates the duration of a whole note in ms
int wholenote = (60000 * 4) / tempo;
int divider = 0, noteDuration = 0;

void setup() {
  //set up each pin as output and input
  pinMode(piezo, OUTPUT);
  digitalWrite(piezo, LOW);
  pinMode(obstaclePin, INPUT);
  smotor.attach(9); //set servo motor pin to pin9 on the arduino
}

void loop() {
  //obstacle will check the obstaclePin for voltage
  obstacle = digitalRead(obstaclePin);
  if (obstacle == LOW) { //LOW means obstacle detected
    smotor.write(60);//servo motor will turn 60 degrees
    delay(1000); //servo motor stay at 60 degrees for 1 second
    smotor.write(0); //servo motor turns back to 0 degree

    //for loop for playing the song
    for (int thisNote = 0; thisNote < notes * 2; thisNote = thisNote + 2) {
      // calculates the duration of each note
      divider = melody[thisNote + 1];
      if(divider > 0) {
      // regular note, just proceed
      noteDuration = (wholenote)/ divider;
      } else if (divider < 0) {
      // dotted notes are represented with negative durations
      noteDuration = (wholenote) / abs(divider);
      noteDuration *= 1.5; // increases the duration in half for dotted notes
      }
      // we only play the note for 90% of the duration, leaving 10% as a pause
      tone(piezo, melody[thisNote], noteDuration * 0.9);
      // Wait for the specified duration before playing the next note.
      delay(noteDuration);
      // stop the waveform generation before the next note.
      noTone(piezo);
      }

  }
  else { //else no obstacle, obstacle is at HIGH state
    digitalWrite(piezo, LOW); //turn off the piezo
```

```
    smotor.write(0); //servo motor angle is at 0 degree
  }
  delay(200); //set a delay between between use to 2ms
}
```

Design Limitations

Our final prototype was designed with the resources provided to its full capabilities. We were not able to 3D print the whole outer surface because the constraint of time did not allow it so we had to settle for the front face of the design so that there was some concept of the design present for the final build. Even though that was not ideal, the piece printed as intended and fits within the constraints provided in the design challenge. The design limitations were that the 3D printed part had to have a 3D printing time of 8 hours or less. It also had to fit within a cubic foot and have code implemented. In terms of the programming there were some issues where the parts would not work as intended, especially the piezo. However, we were able to figure it out and now it plays a tune for 20 seconds as intended when a hand gets close to the sensor. A personal limitation we experienced was that the servo motors did not provide much power by themselves so if we had the resources we could have gotten a stronger motor to make the product work smoothly. If our team had more time and money, the product could be completely 3d printed out of plastic making it biodegradable and mass producible. The soap dispenser that is inside can also be changed to a bag that is easier to fit inside the product and can store more of the product since it is not a fixed shape. In terms of resources there could also be more considerations like adding ridges like the original concept picture, making it portable by having a smaller circuit hence it can be smaller in size. If our team had more time, we could have come up with a line of different character designs along with different theme songs to provide diversity and to appeal to different children. Lastly, we could also replace some of the parts like the audio so that it could play more creative types of sounds. These changes would be made to satisfy the need of the user, making the price worth the product. This will overall improve the experience for both the parents and the kids utilizing it.

Tinkercad Circuits File



The Tinkercad circuit file can be found under our group file, Team #9, under the tinkercad circuit file folder.

Tinkercad file link:
https://www.tinkercad.com/things/7sOcUOC1hUn-powerful-jaagub-snaget/editel?sharecode=wZW0TUYjFXIofZj-YpXQ4-qGI5AKNV001bsjaFdygvk

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Appendix

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ess.

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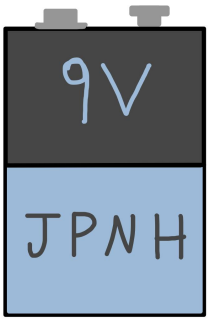
TEAM CHARTER

The purpose of this document is to develop a charter for your team and to help you establish many of the necessary ground rules for team meetings, interaction, and performance systematically. This charter should cover at the bare minimum the items listed subsequently. The expectation is that by establishing this document, the team will function more smoothly and efficiently.

Team name and logo

9 Lives Engineering



Communication Plan

First Name, Last Name	**UF email**	**Other contact information**
Jennifer Senra	jsenrabruzon@ufl.edu	786-602-2716
Pablo Moreno	Morenopablo@ufl.edu	904-955-2560
Nick Manco	nicholasmanco@ufl.edu	813-696-1142
Hao Lin	haolin@ufl.edu	904-699-3669

Mission statement (Team purpose)

We want to work together cohesively, enjoy the project, make a badass (feasible) product, and get a fantastic grade.

Meeting management (preferred meeting times and place to work outside class)

Pablo and Nick:

Zoom or In person (depending if people can meet)

weekends, Mon/Thu/Fri mornings, and weekday evenings can work (5:00-6:00, or 8:00-900),

Jennifer: Tues/Thur 4:00-10:00

Hao: Tue/Thur afternoon evening

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Team Norms

(some examples include: meeting duration, have a deliverable or outcome for the meeting, if you are unable to attend a meeting, let the organizer know as far in advance as possible, and it is your responsibility to find out what happened, listen without interrupting, etc.)

Meet for at least an hour, up to 2 or 2 ½, depending on what people's schedules allow for

Cooperate and listen to people's ideas

If we set a meeting time, try to make it unless you have something sudden come up. In that case, let us know as soon as you can.

Communicate often.

Help team if someone has questions about a process

Ask others questions if needed. No judgements, would rather have everybody up to pace, and prevent future problems.

Plan of Labor Division

(Describe how as a team you will approach the division of work/effort in this project)

Google docs will be used to help digitally work together, and give access for people to work individually on their own schedule

Evaluate time requirement of different parts of assignment, try to divide as evenly as possible

If two people are working on a single task, they should communicate on how they want to complete it together (each take a piece at a time, work simultaneously, etc.)

Please include any additional information/agreement for making your teamwork more successful.

[Nick] I cannot think of any. Add if you have any ideas

All team members sign the team charter agreement to certify their endorsement and commitment to uphold the team charter.

Name	Signature
1. _____Jennifer Senra_____	_____Jennifer Senra_____
2. _____Pablo Moreno_____	_____Pablo Moreno_____
3. _____Nick Manco_____	_____Nicholas Manco_____
4. _____Hao Lin_____	_____Hao Lin_____

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Final Project Parallel Prototyping

Parallel Prototyping- Engineering Design Ideation

Team Member Name: Jennifer Senra Bruzon UF-ID: 20414348

Group name: 9 Lives Engineering

Instructions:

Complete all the items below. Please note you may need to use or go back to previous assignments to respond to the questions.

1. List all the design constraints below:
   -Feasibility

   -Cost

   -Efficiency

   -Safety

   -Ease of use

   -Mass productivity

2. Copy and paste the Decision Matrix Excel Sheet that your group completed in the prior assignment, where you had to identify together the criteria and areas of priority in your design. As a reminder, the project should be human-centered and should focus on topics such as inclusion, access, sustainability, etc. Include a screenshot of your final team Decision Matrix here:

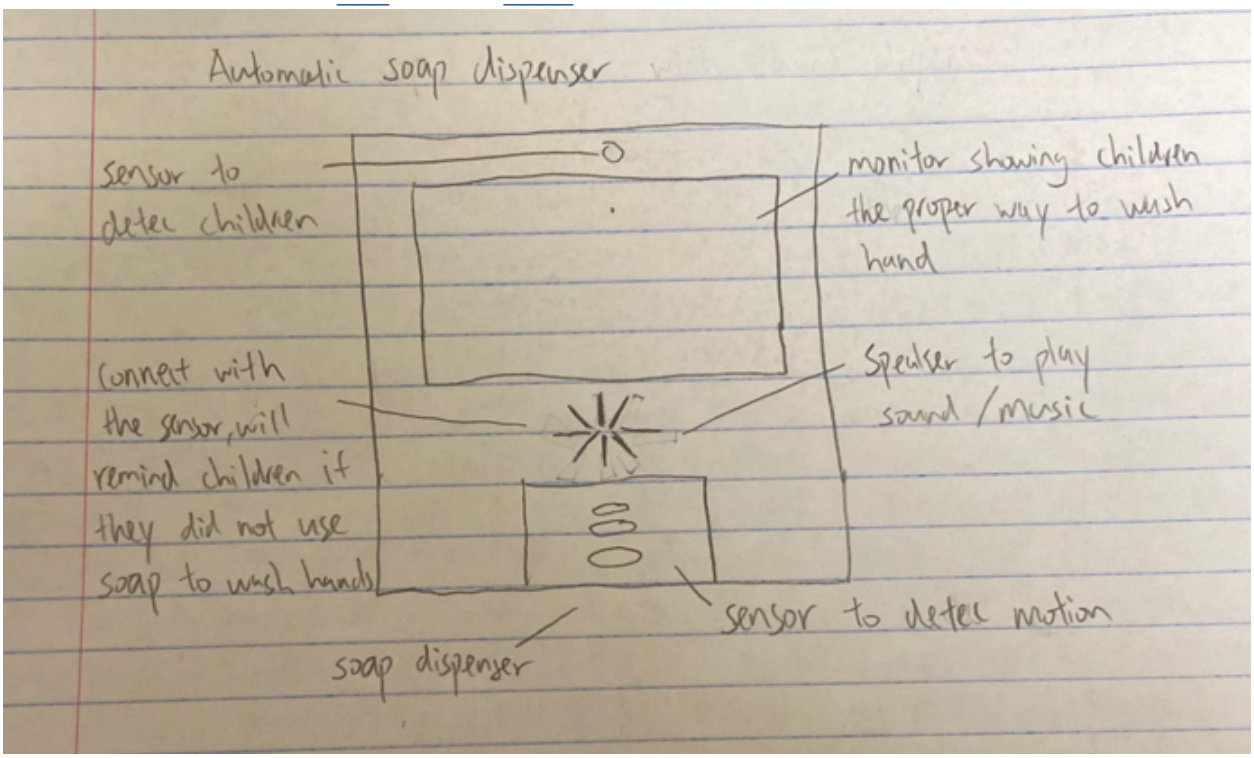
ATTRIBUTE (OR FACTOR)	List each attribute (or factor) you need to consider when deciding on the best overall solution or design.	Feasibility	Cost	Efficiency	Safety	Ease of use	Mass Producibility	SUMS
FACTOR (OR ATTRIBUTE) PRIORITY MULTIPLIER	On a scale of 1 to 10, where ten is highest and one is lowest, rate the priority you should give for the factor (or attribute) above.	7	9	10	8	9	6	
Design	Design Ideas	DESIGN IDEA WEIGHT: On a scale of 1 to 10, where ten is the highest and one is the lowest, rate your design idea.						
A	Automatic Character Soap Dispenser	10	8	8	9	10	9	438
B	Automatic Door Handle Cleaner	8	7	9	9	10	8	419

3. Revisit the Decision Matrix of your group and summarize in 3-4 sentences how your group's design idea will integrate the top 3 scores from the table, taking into consideration the constraints. This is also a good opportunity to revisit your assignment and make changes here, if needed. This will become your TEAM GOAL:

We want to make a soap dispenser that is efficient in helping people stay healthy during cold/flu season and the product itself must be cost-friendly so the majority of households can obtain it. Our goals included making the product automatic to reduce surface touching in a simple way. As a team, we decided the product should improve children's hygiene by making hand-washing fun.

4. Provide sketches or flowcharts that describe how you would INDIVIDUALLY tackle the team goal. Please include a picture, scan, or screenshot of your image on the table provided.

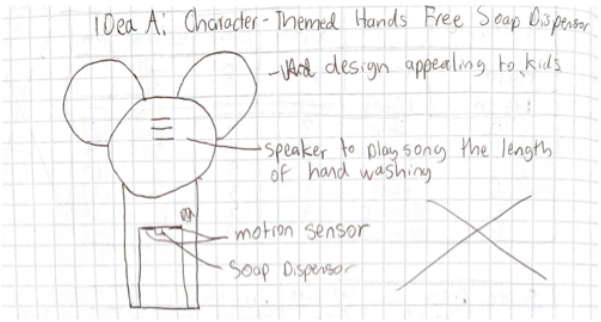
Team Member 1 Name: ___Hao Lin____



The product is a smart soap dispenser with a small monitor screen that looks like a Among Us character. When the sensor detects hand movement, it will dispense the soap and the monitor will play

a small video showing children the proper way to wash hands. Also, there is another sensor on the top of the dispenser which will detect children's presence, when the children wash hands without using the soap it will alert the children.

Team Member 2 Name: _____Pablo Moreno_____



The main shape of the dispenser is of a beloved children's character: Mickey Mouse. For this to be mass produced and sold, a deal with Disney must be made. If this cannot be accomplished, a children's character in the public domain can be used. The dispenser will have a speaker play a theme song for twenty seconds to get children excited about washing their hands, while reminding them of the proper length to wash their hands. It is activated by a motion sensor to prevent the unnecessary spread of germs.

Team Member 3 Name: _____Nick Manco_____

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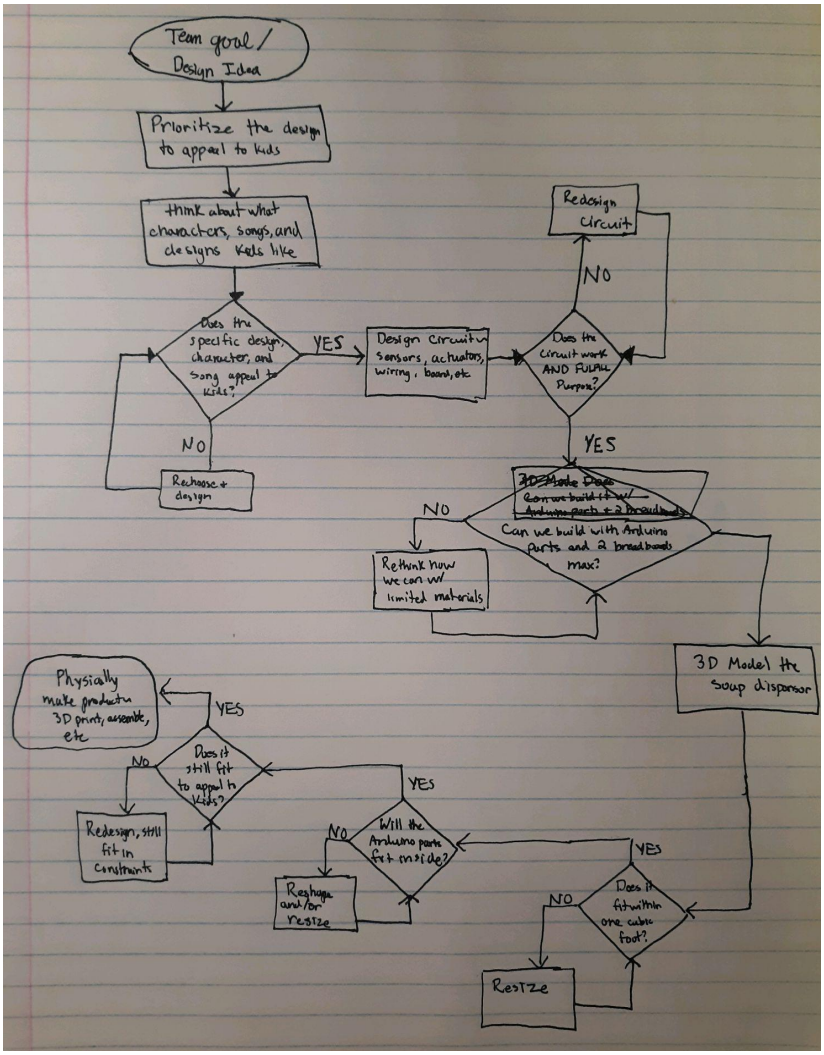
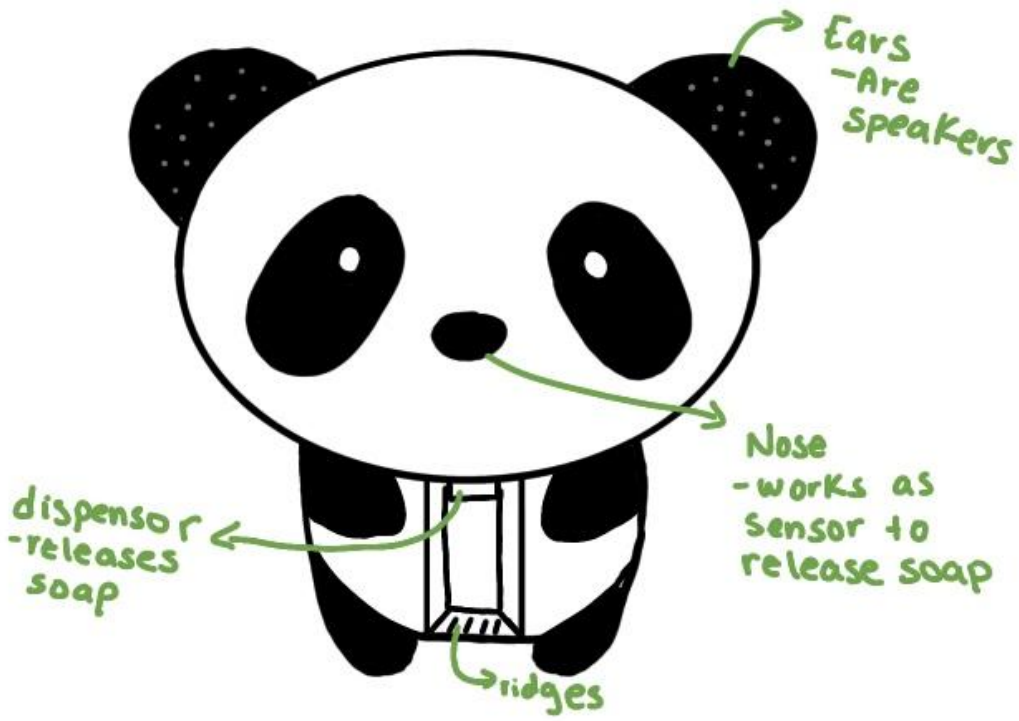


My focus when creating a flowchart for the design process is to place the higher priorities earlier in the process. For instance, I feel that appealing to kids is the biggest issue this product addresses (because automatic soap dispensers already exist by themselves). Therefore, I put the design and appeal to kids first, and afterwards, we work on making the product work with our Arduino and 3D printing size constraints. Until right before we start making the product, we still must check that it appeals to kids.

Team Member 4 Name: Jennifer Senra



The shape of the product is a panda character that appeals to a young audience. It has sensory technology implemented that makes it hand free and easy to use. At the bottom there are ridges installed that prevent soap from falling to the ground making it kid friendly. It also has speakers in the panda ears that can play theme songs that encourage hand washing and overall makes it a fun experience.

5. Consider each individual team member idea and corresponding sketch/flowchart. As a group, discuss how each idea attends to the team goal as well as the focus on human-centered design. Enter a summary of your discussions below. As a group, identify what would be the next steps for your project idea.

- How does the idea attend to the team goal?
  The idea attends to the team goal as all our designs are automatic dispensers that use sensors to detect movement to reduce surface touching. In addition, the dispenser is designed to look like a child-friendly character with an audio sound system which will help make hand washing fun. As a result, we can help kids develop healthy hygiene habits like washing their hands for the appropriate amount of time.

• How does the idea attend to human centered design? When focusing on the users, it would be parents and children. To address parents' concerns of their kids having poor hygiene and passing germs to them, the design brings fun and audio to stimulate proper handwashing. For children, it is fun to use. Furthermore, parents would want this to be cheap and effective, otherwise they would not buy it, which it will be as the product will be made out of plastic and simple in order to mass produce as well as be easy to use for children.
Team Member Name 1: Hao Lin
Team Member Name 2: Pablo Moreno
Team Member Name 3: Nick Manco
Team Member Name 4: Jennifer Senra Bruzon
Next Steps for Group: Start the making of the product: figure out the sensors/actuator ability, figure out the circuitry, research how a soap dispenser works, and start the 3d modeling

Team #9:

Team Photo

Jennifer Senra
Roles: 3d-designer, Writer, Organizer, Empathy Map Designer, Builder

Pablo Moreno
Roles: Empathy Map Designer, Writer, Idea Proposer, Builder

Nick Manco
Roles: Writer, Flowchart Designer, Organizer, Builder

Hao Lin
Roles: Code Writer, Circuit creator, Supplier, Builder

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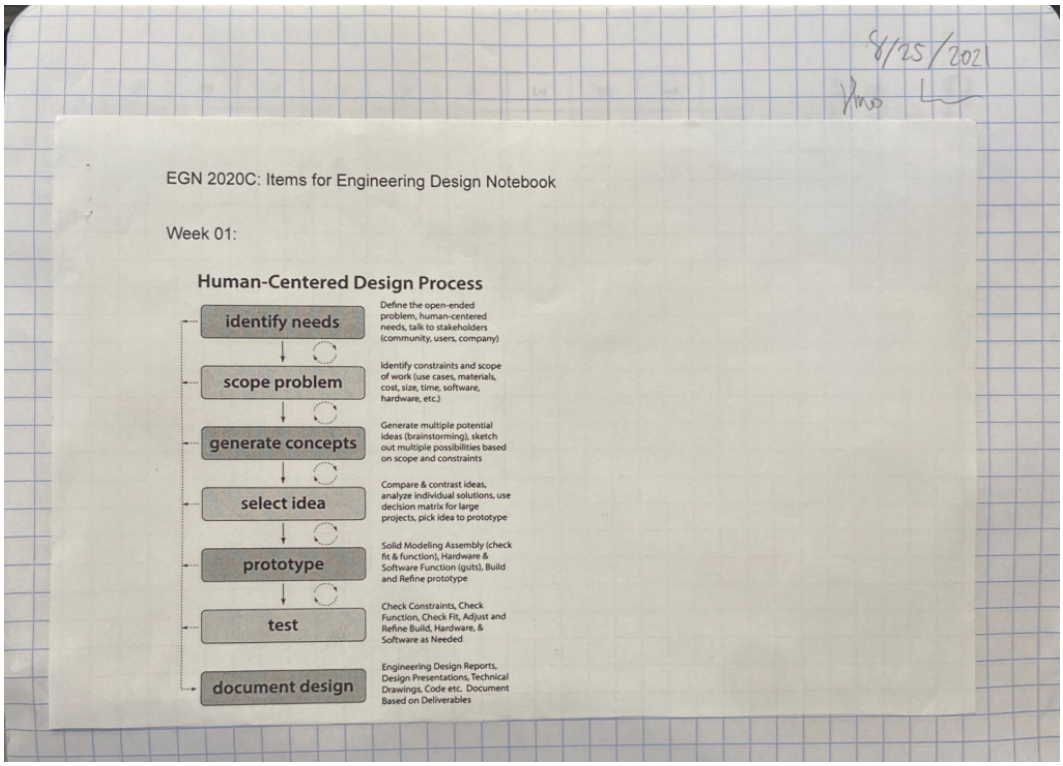
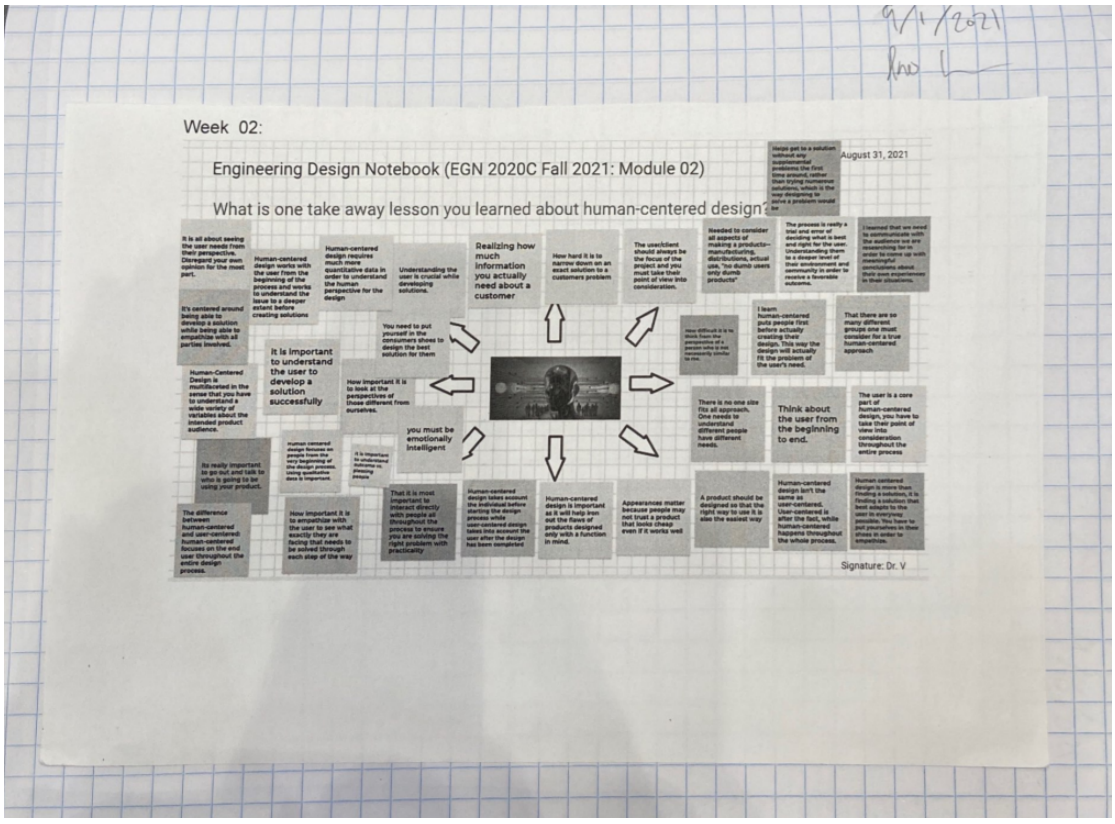
Hao Lin Individual Notebook





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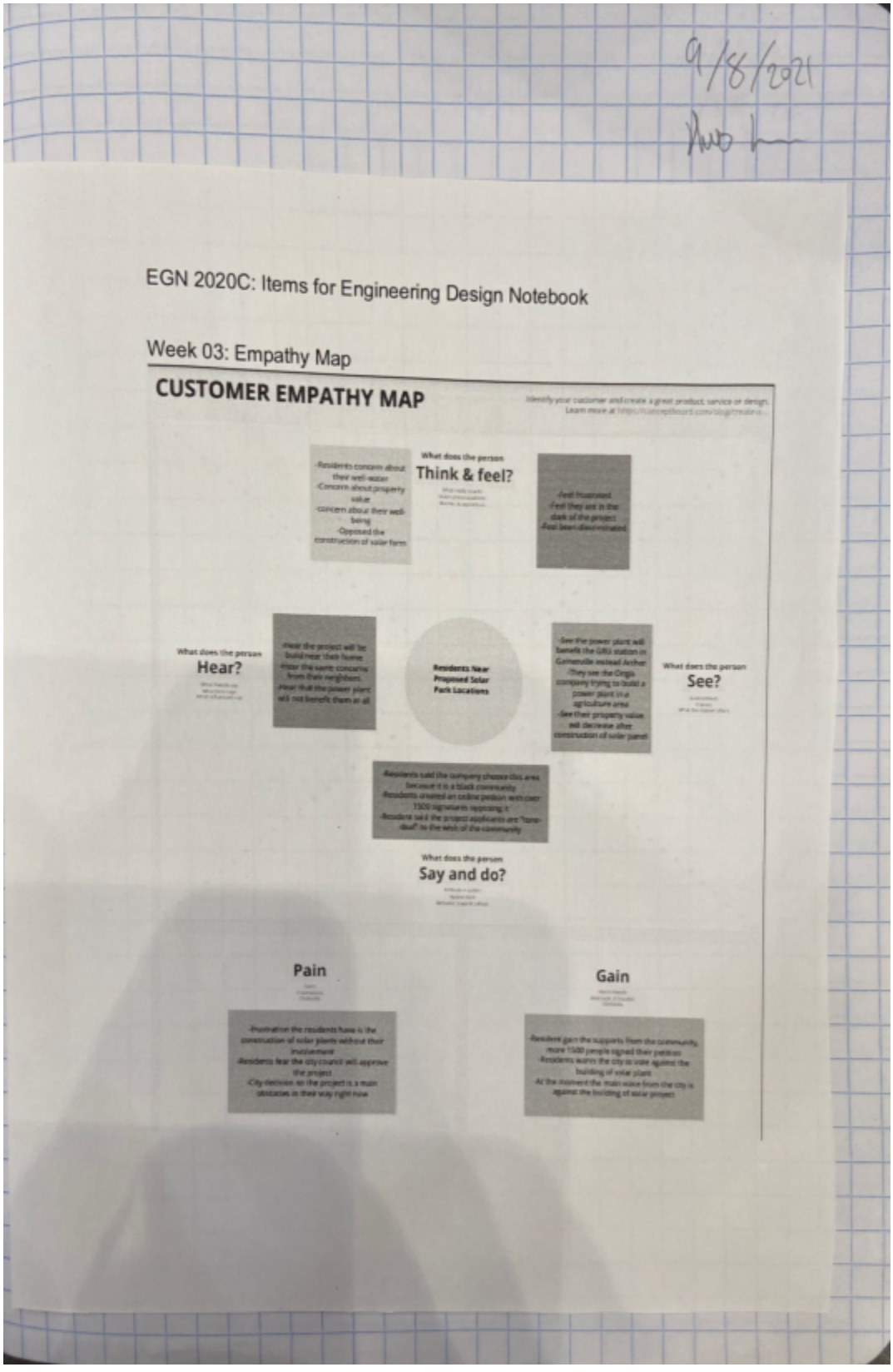

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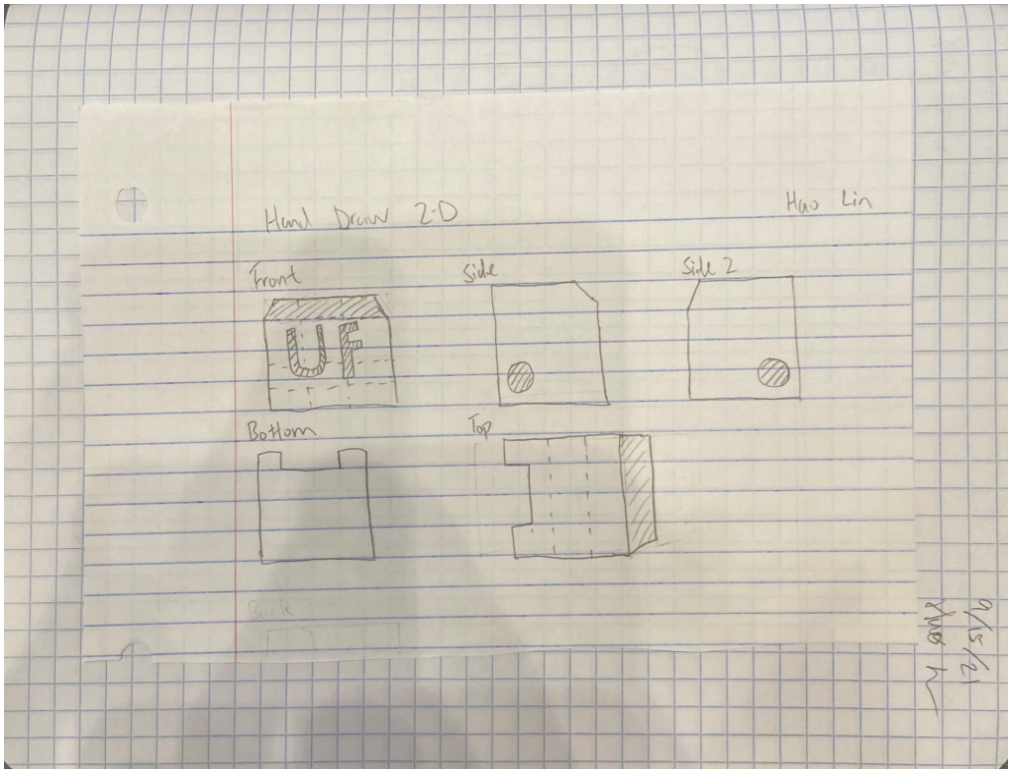

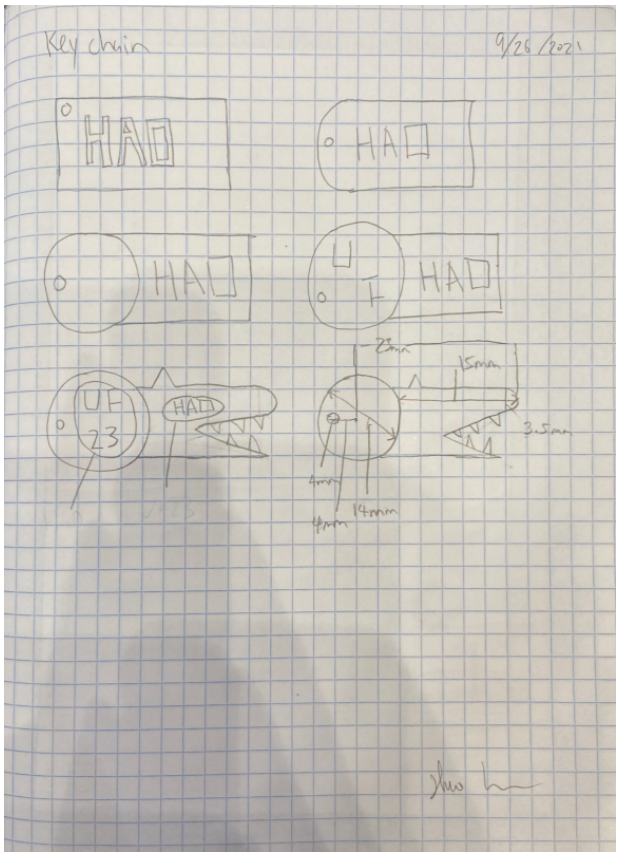

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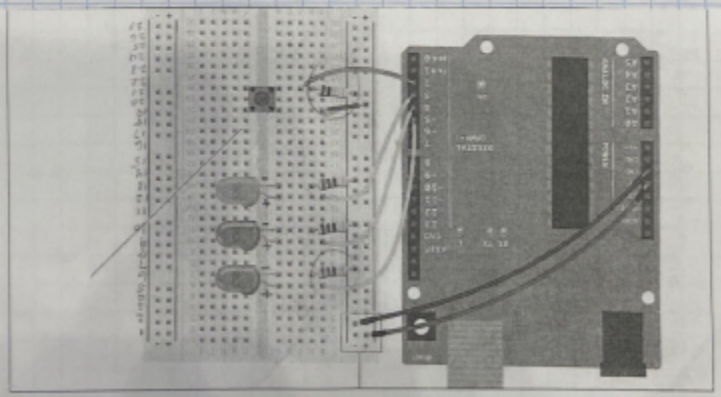
Component	Microcontroller	BreadBoard
Switch		'e' strip and 'f' strip; Row 22 'e' strip and 'f' strip; Row 24
RED LEDs		'e' strip; Rows 6 and 7 'e' strip; Rows 10 and 11
Green LEDs		'e' strip; Rows 14 and 15
220 Ω resistors		(-) Strip and 'b' strip; Row 7 (-) Strip and 'b' strip; Row 11 (-) Strip and 'b' strip; Row 15
10 kΩ resistor		(-) Strip and 'b' strip; Row 24
Long Red Jumper Cable	Power (5V)	(+) Strip; Row 1
Long Black Jumper Cable	Power (GND)	(-) Strip; Row 2
Medium Yellow Jumper Cables	PWM Pin: 5~ Digital Pin: 4 PWM Pin: 3~	'a' Strip; Row 6 'a' Strip; Row 10 'a' Strip; Row 14
Short Red Jumper Cable		(+) Strip and 'a' Strip; Row 22
Short Green Jumper Cable	Digital Pin: 2	'c' Strip; Row 24

9/22/2021



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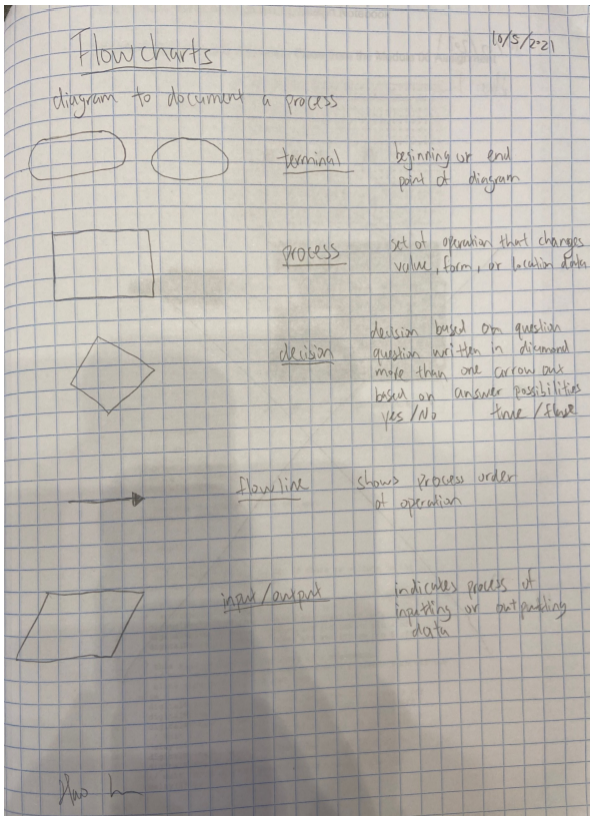

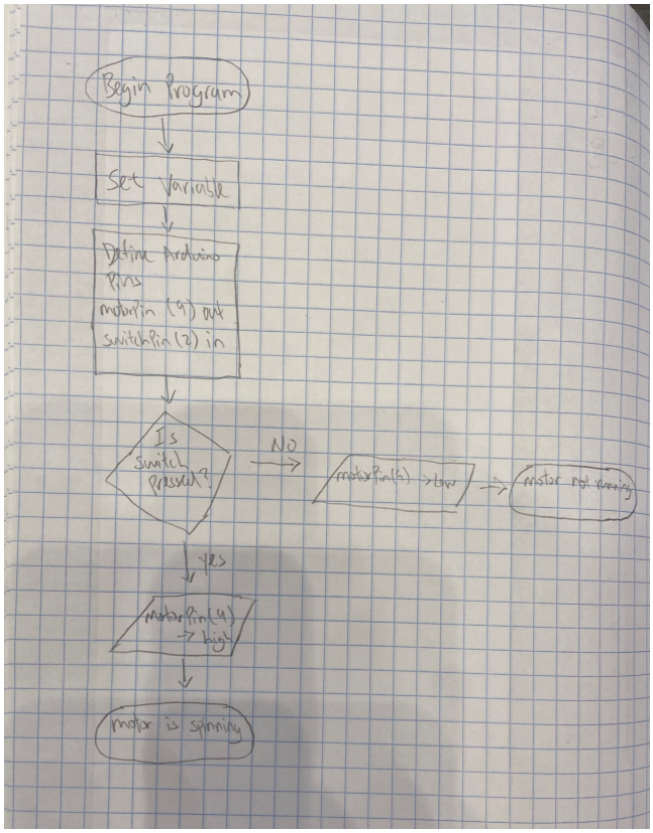

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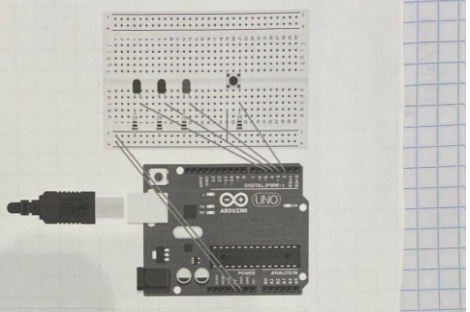
EGN 2020C: Items for Engineering Design Notebook

Week 07: Block Coding Attempt in Class from the Module 06 Assignment



Text — 1 (Arduino Uno R3)

```
int switchstate = 0;

void setup() {
  // declare the LED pins as outputs
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);

  // declare the switch pin as an input
  pinMode(2, INPUT);
}

void loop() {

  // read the value of the switch
  // digitalRead() checks to see if there is voltage on the pin or
  switchstate = digitalRead(2);

  // if the button is not pressed turn on the green LED and off the
  if (switchstate == LOW) {
    digitalWrite(3, HIGH); // turn the green LED on pin 3 on
    digitalWrite(4, LOW);  // turn the red LED on pin 4 off
    digitalWrite(5, LOW);  // turn the red LED on pin 5 off
  }
  // this else is part of the above if() statement.
  // if the switch is not LOW (the button is pressed) turn off the
  // blink alternatively the red LEDs
  else {
    digitalWrite(3, LOW);  // turn the green LED on pin 3 off
    digitalWrite(4, LOW);  // turn the red LED on pin 4 off
    digitalWrite(5, HIGH); // turn the red LED on pin 5 on
    // wait for a quarter second before changing the light
    delay(250);
    digitalWrite(4, HIGH); // turn the red LED on pin 4 on
    digitalWrite(5, LOW);  // turn the red LED on pin 5 off
    // wait for a quarter second before changing the light
    delay(250);
  }
}
```

10/13/2021

EGN 2020C: Items for Engineering Design Notebook

Week 08: Decision Matrix around Inclusive Design and Human-Centered Design (completed in class per team)

	1-2	3-4	5-6	
USER	Florida	New York	Mississippi	Find out about: - Median Income - Major Industries - Education Level
NEEDS	Access to Health Care within driving distance	Efficient Infrastructures (building, housing, etc.)	Public Transportation (to reduce greenhouse emission)	Find out about: - Available resources or programs
CONSTRAINTS	Income (poor, middle class, rich)	Ability (physical, learning, non-apparent, etc.)	Education Level (high school, college, grad school or above)	Find out about: - The community of interest and where they stand in terms of constraints.

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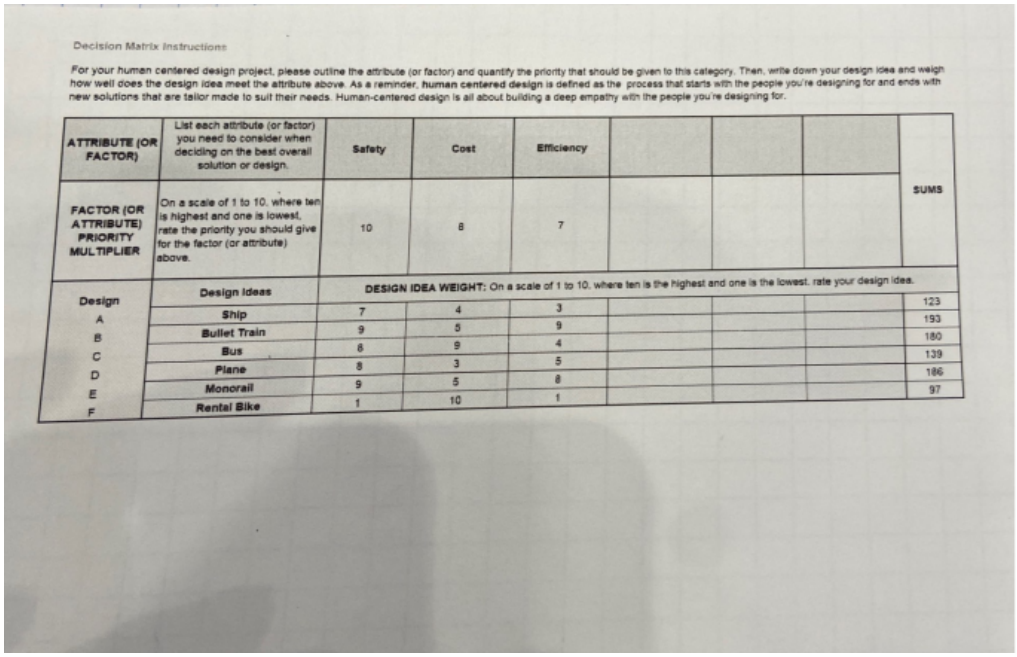
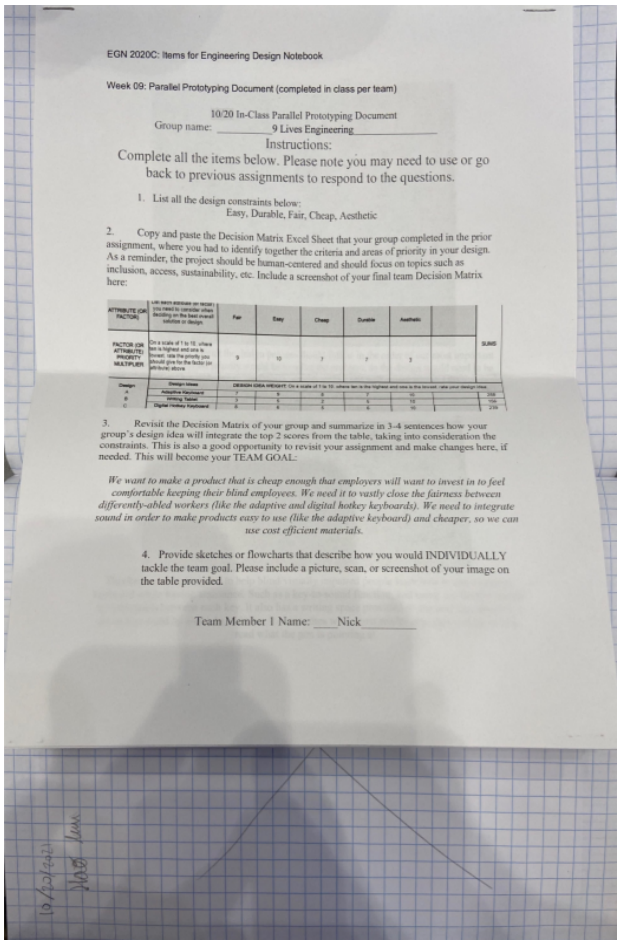


Decision Matrix Instructions

For your human centered design project, please outline the attribute (or factor) and quantify the priority that should be given to this category. Then, write down your design idea and weigh how well does the design idea meet the attribute above. As a reminder, human centered design is defined as the process that starts with the people you're designing for and ends with new solutions that are tailor made to suit their needs. Human-centered design is all about building a deep empathy with the people you're designing for.

ATTRIBUTE (OR FACTOR)	List each attribute (or factor) you need to consider when deciding on the best overall solution or design.	Safety	Cost	Efficiency				SUMS
FACTOR (OR ATTRIBUTE) PRIORITY MULTIPLIER	On a scale of 1 to 10, where ten is highest and one is lowest, rate the priority you should give for the factor (or attribute) above.	10	8	7				
Design	Design Ideas	DESIGN IDEA WEIGHT: On a scale of 1 to 10, where ten is the highest and one is the lowest, rate your design idea.						
A	Ship	7	4	3				123
B	Bullet Train	9	5	9				193
C	Bus	8	9	4				180
D	Plane	8	3	5				139
E	Monorail	9	5	8				186
F	Rental Bike	1	10	1				97



EGN 2020C: Items for Engineering Design Notebook

Week 09: Parallel Prototyping Document (completed in class per team)

10/20 In-Class Parallel Prototyping Document

Group name: _____9 Lives Engineering_____

Instructions:

Complete all the items below. Please note you may need to use or go back to previous assignments to respond to the questions.

1. List all the design constraints below:
   Easy, Durable, Fair, Cheap, Aesthetic

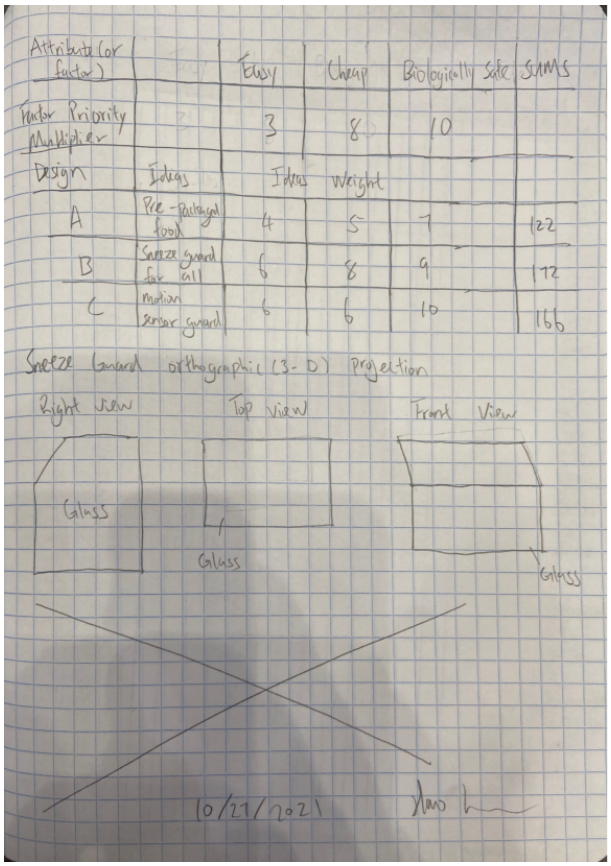
2. Copy and paste the Decision Matrix Excel Sheet that your group completed in the prior assignment, where you had to identify together the criteria and areas of priority in your design. As a reminder, the project should be human-centered and should focus on topics such as inclusion, access, sustainability, etc. Include a screenshot of your final team Decision Matrix here:

3. Revisit the Decision Matrix of your group and summarize in 3-4 sentences how your group's design idea will integrate the top 2 scores from the table, taking into consideration the constraints. This is also a good opportunity to revisit your assignment and make changes here, if needed. This will become your TEAM GOAL:

We want to make a product that is cheap enough that employers will want to invest in to feel comfortable keeping their blind employees. We need it to vastly close the fairness between differently-abled workers (like the adaptive and digital hotkey keyboards). We need to integrate sound in order to make products easy to use (like the adaptive keyboard) and cheaper, so we can use cost efficient materials.

4. Provide sketches or flowcharts that describe how you would INDIVIDUALLY tackle the team goal. Please include a picture, scan, or screenshot of your image on the table provided.

Team Member 1 Name: ___Nick_____



Attribute (or factor)		Easy	Cheap	Biologically safe	SUMS
Factor Priority Multiplier		3	8	10	
Design	Ideas	Ideas	Weight		
A	Pre-Biological Book	4	5	7	122
B	Sneeze guard for all	6	8	9	172
C	Motion sensor guard	6	6	10	166

Sneeze Guard orthographic (3-D) Projection

Right View

Glass

Top View

Glass

Front View

Glass

10/27/2021

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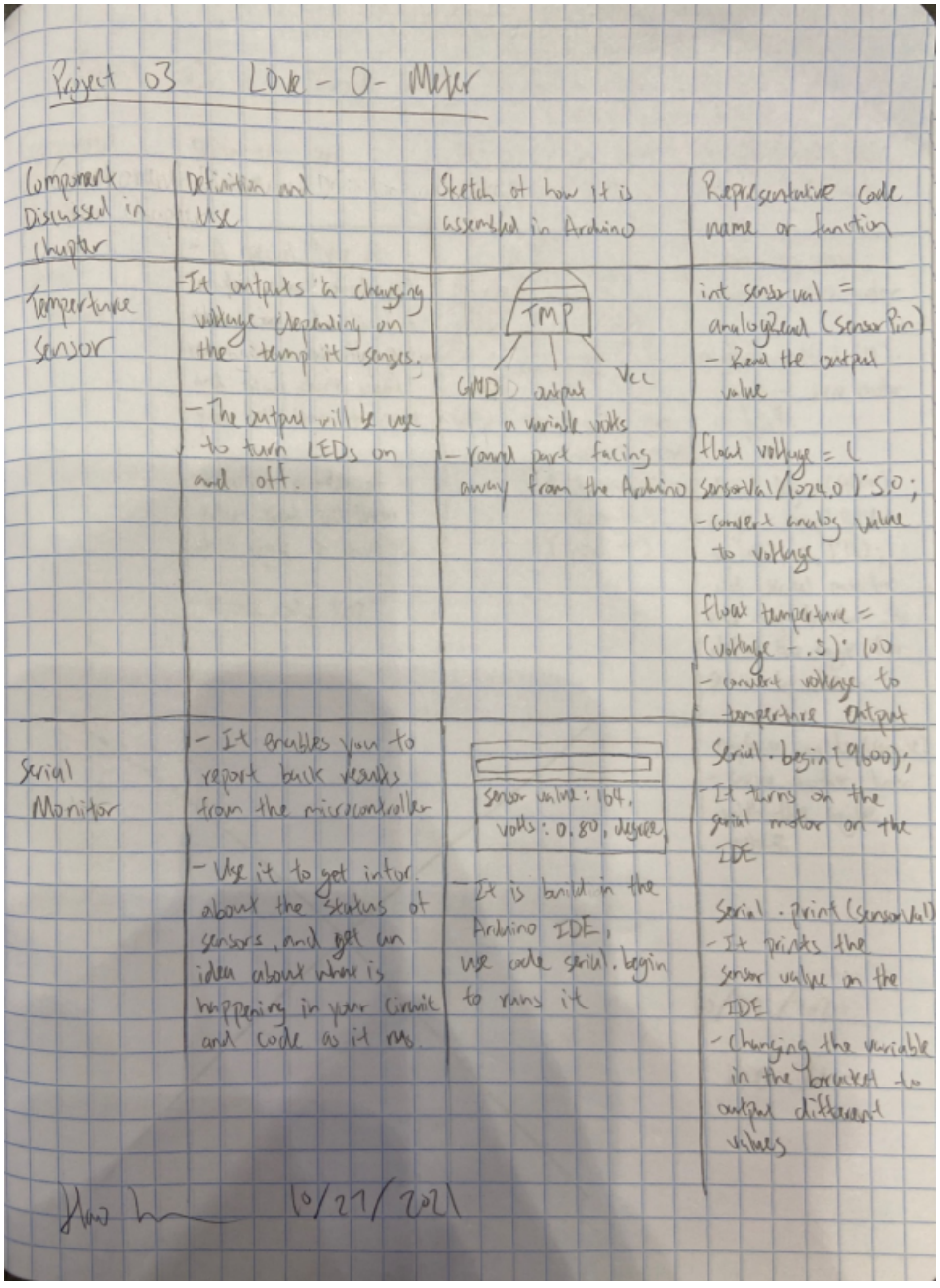

Project 03 Love-O-Meter

Component Discussed in chapter	Definition and Use	Sketch of how it is assembled in Arduino	Representative code name or function
Temperature Sensor	- It outputs a changing voltage depending on the temp it senses. - The output will be use to turn LEDs on and off.	TMP GND output Vcc in variable volts - round part facing away from the Arduino	int sensorVal = analogRead(sensorPin) - Read the output value float voltage = (sensorVal/1024.0)*5.0; - convert analog value to voltage float temperature = (voltage - .5)*100 - convert voltage to temperature output
Serial Monitor	- It enables you to report back results from the microcontroller - Use it to get info. about the status of sensors, and get an idea about what is happening in your circuit and code as it runs.	sensor value: 164, volts: 0.80, degrees - It is built in the Arduino IDE, use code serial.begin to runs it	Serial.begin(9600); - It turns on the serial motor on the IDE Serial.Print(sensorVal) - It prints the sensor value on the IDE - Changing the variable in the brackets to output different values

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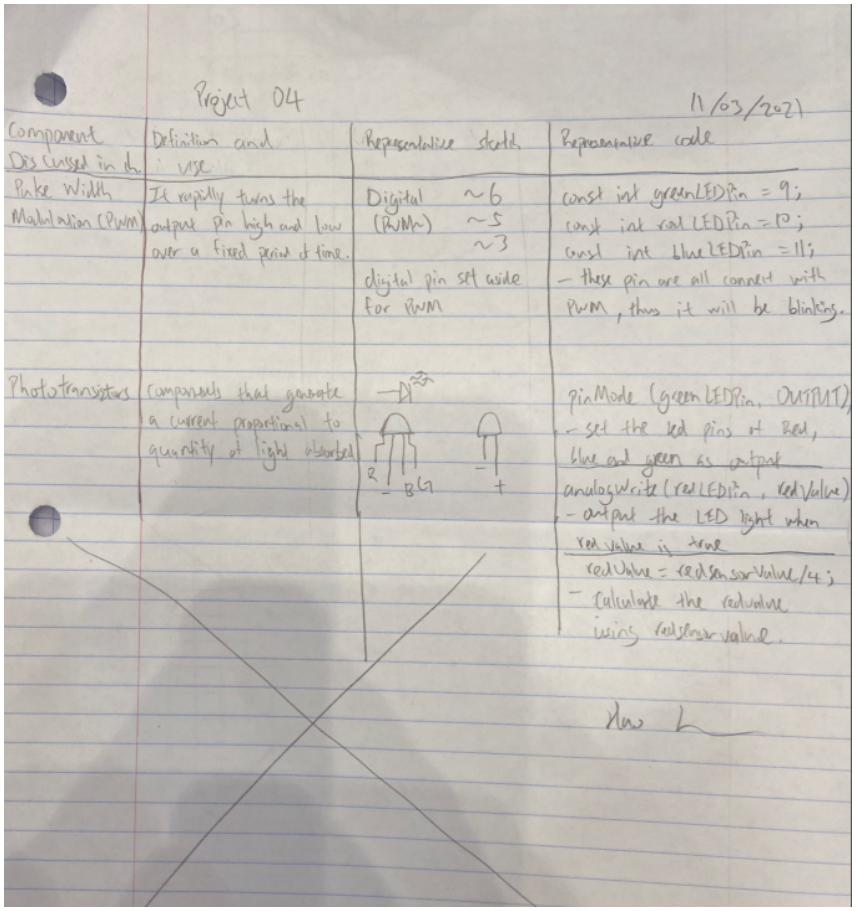
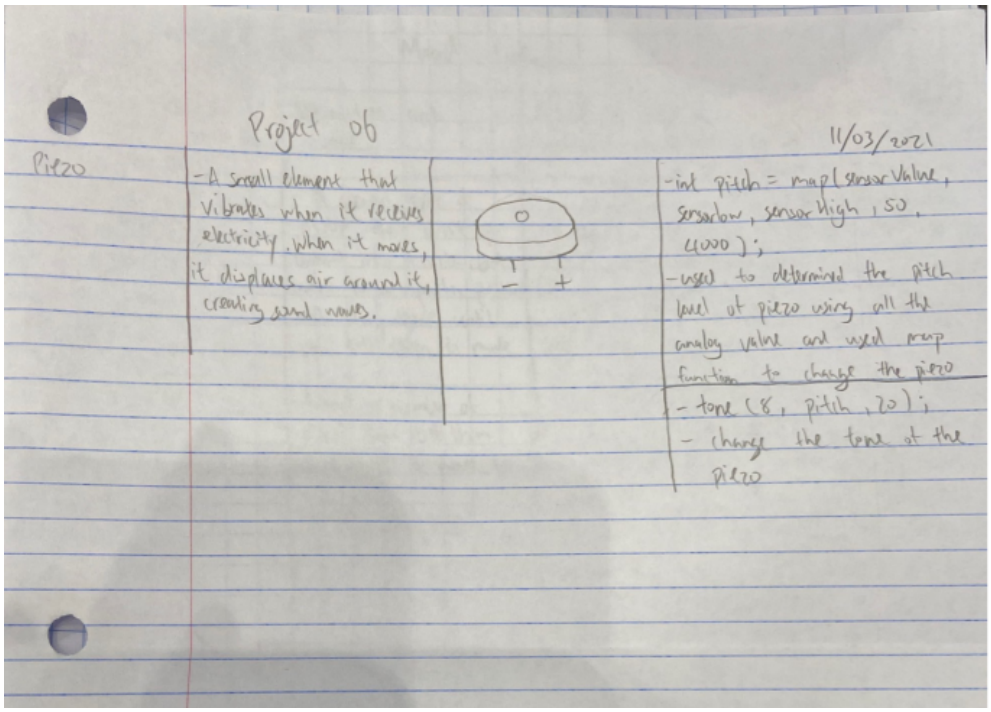


Project 04 — 11/03/2021

Component Discussed in the Video	Definition and Use	Representative Sketch	Representative Code

Pulse Width Modulation (PWM)	It rapidly turns the output pin high and low over a fixed period of time.	Digital ~6 (PWM) ~5 ~3
		digital pin set aside for PWM
			const int greenLEDPin = 9;
			const int redLEDPin = 10;
			const int blueLEDPin = 11;
			- these pin are all connect with PWM, thus it will be blinking.

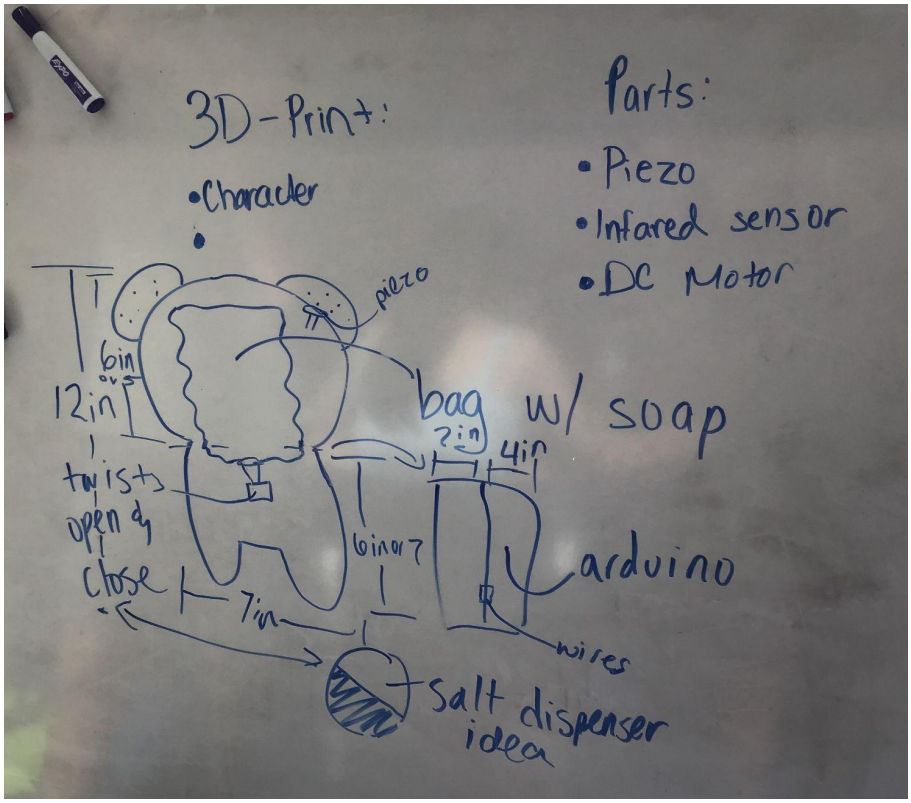
Phototransistors	components that generate a current proportional to quantity of light absorbed		pinMode (greenLEDPin, OUTPUT) - set the led pins of Red, blue and green as output analogWrite (redLEDPin, redValue) - output the LED light when redValue is true redValue = redSensorValue/4; - calculate the redvalue using redsensor value.



Project 06 — 11/03/2021

Piezo	- A small element that vibrates when it receives electricity. When it moves, it displaces air around it, creating sound waves.		- int pitch = map(sensorValue, sensorLow, sensorHigh, 50, 4000); - used to determined the pitch level of piezo using all the analog value and used map function to change the piezo - tone(8, pitch, 20); - change the tone of the piezo

Additional images:



Final Prototype: