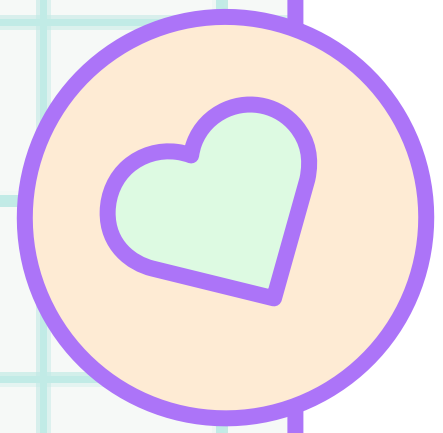
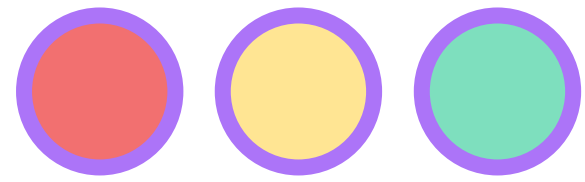


# Handwriting Helper



By Group 3: Annie Stocks, Ashley  
Maurer, Payton Moore, Jonathan  
Eason, Liliana Remillard





# The Tech Titans!



Left to right: Payton Moore, Annie Stocks  
Natalias, Liliana Remillard, Ashley Maurer,  
Jonathan Eason







# Human-Centered User Needs



We strive to  
help young kids  
learn to write  
correctly in the  
classroom!



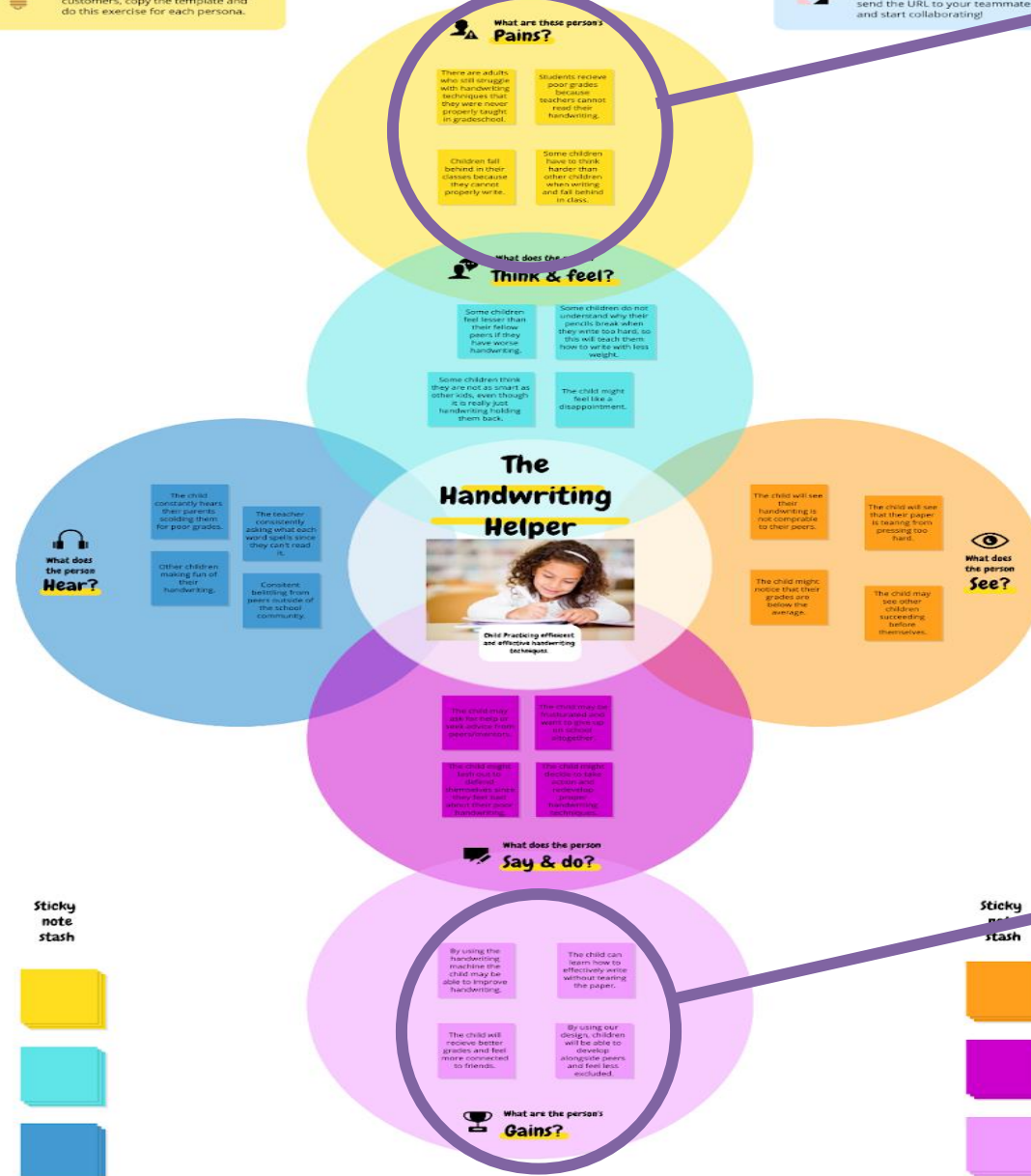
# User Empathy Map

## How it works

- 1 Gather your team and start by defining who your customer is. Add a picture and a name on the center of the map.
- 2 This exercise is complete after six rounds. For each round, choose a section, set the timer to 3 minutes and invite the team to add sticky notes with their ideas. Use the sticky note stash to speed up the process!
- 3 When the time is up, set a new timer for 5 minutes and open a discussion about the ideas on the sticky notes. If necessary, make adjustments to help you be clear about how your customer identifies with each topic.
- 4 At the end of the 6 rounds, review the board to confirm that the team has a good understanding of who their customer is. Learn more: <https://conceptboard.com/blog/creating-a-user-empathy-map/>

**Expert tip**  
If your product targets different customers, copy the template and do this exercise for each persona.

Get the full Conceptboard experience by inviting more participants to your board. Just send the URL to your teammates and start collaborating!



Source: XPLANE.com

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## Pains

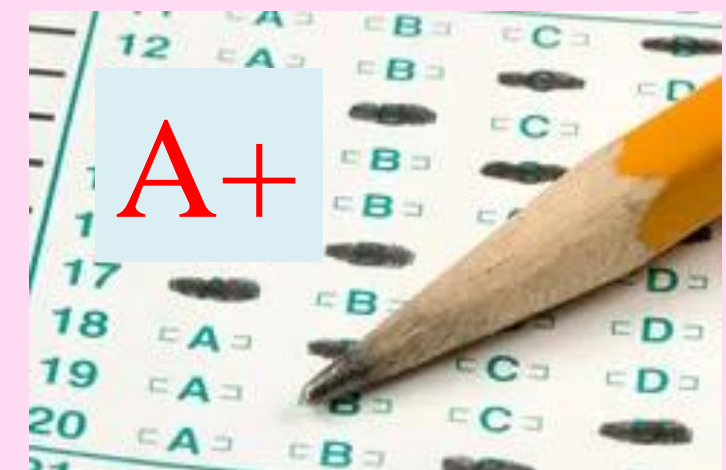
- Struggle with a lifelong skill
- Poor grades
- Fall behind in class
- Assignments take more effort



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## Gains

- Help improve handwriting overall
- Write without tearing the paper
- Better grades and connection to peers



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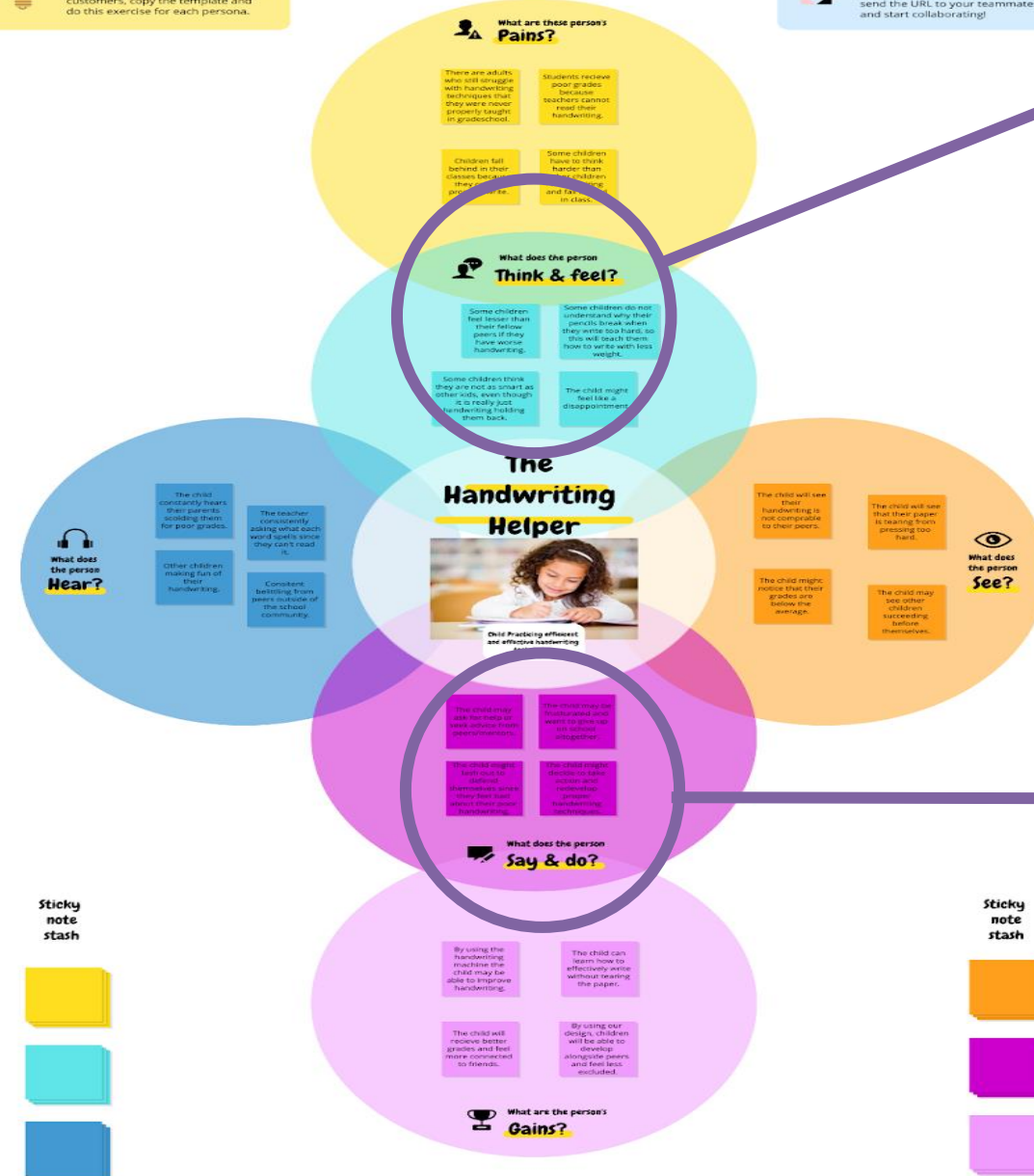
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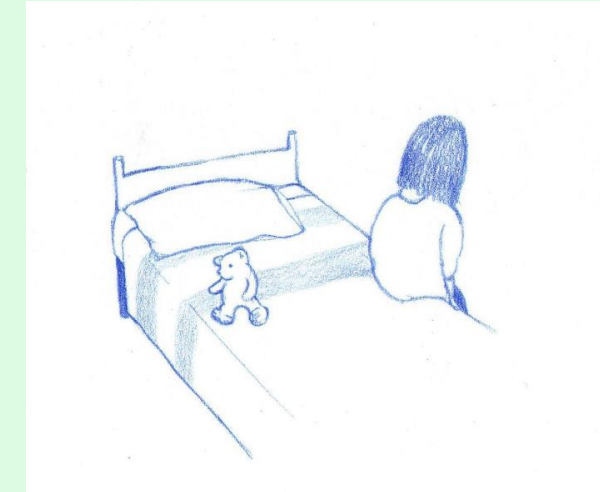
**Expert Tip**  
If your product targets different customers, copy the template and do this exercise for each persona.

Get the full Conceptboard experience by inviting more participants to your board. Just send the URL to your teammates and start collaborating!



## Think/Feel

- Feel lesser than peers
- Don't understand why pencils break
  - Feel like a disappointment
- Feel not as intelligent



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## Say/Do

- Ask for help from peers/ teachers
- Frustrated students
- Aids in practice of their handwriting in the classroom



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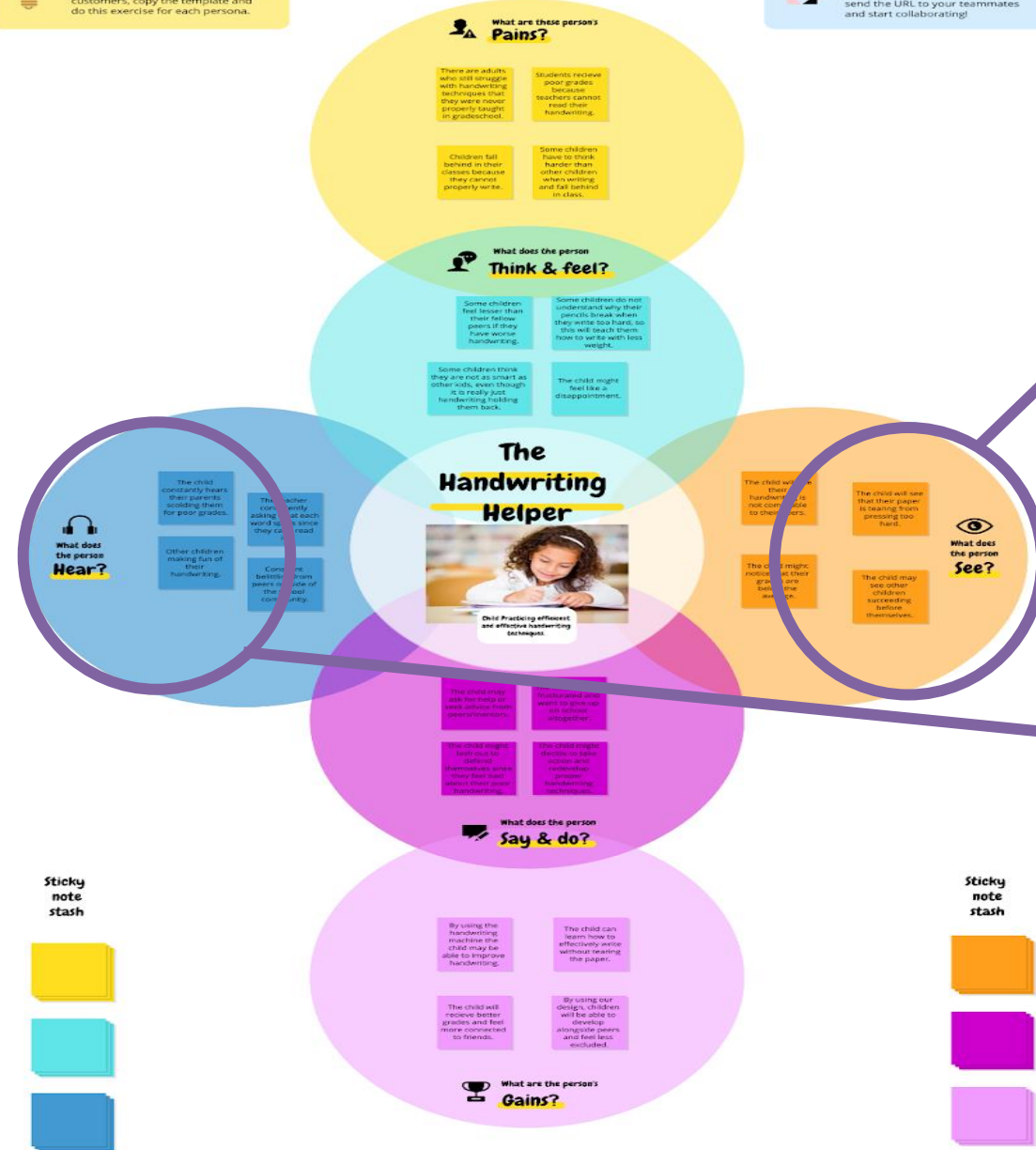
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**Expert Tip**  
If your product targets different customers, copy the template and do this exercise for each persona.

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## See

- Handwriting differences
- Torn paper
- Low grades
- Other children succeeding while they fail



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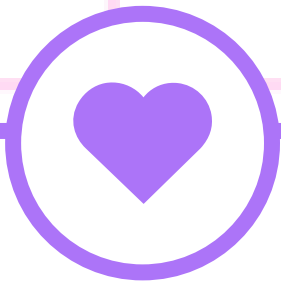
## Hear

- Parents scolding them for poor grades
- Teachers asking about handwriting
- Insults from other children
- Insults from peers

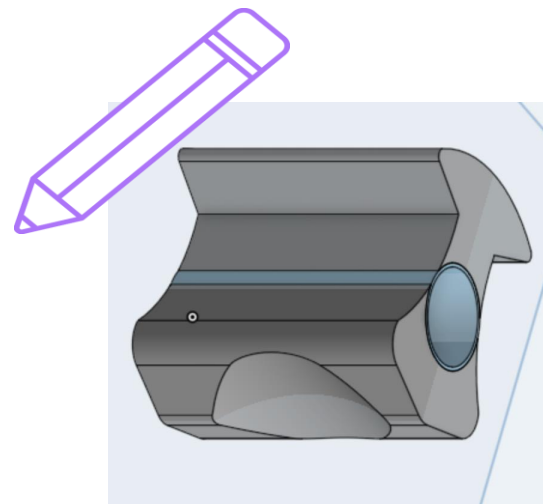


"1-Jpeg-dennis-sharon-January 20, 2009-85 mm" by Dr.J.S is licensed under CC BY-NC-ND 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nd-nc/2.0/jp/?ref=openverse>.

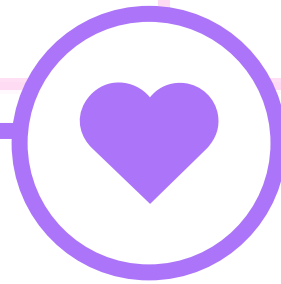
# HUMAN-CENTERED CONSIDERATIONS



## Pencil Grip



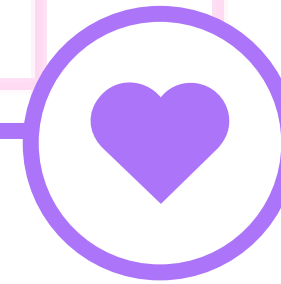
Lateral Quadrupod  
Grip



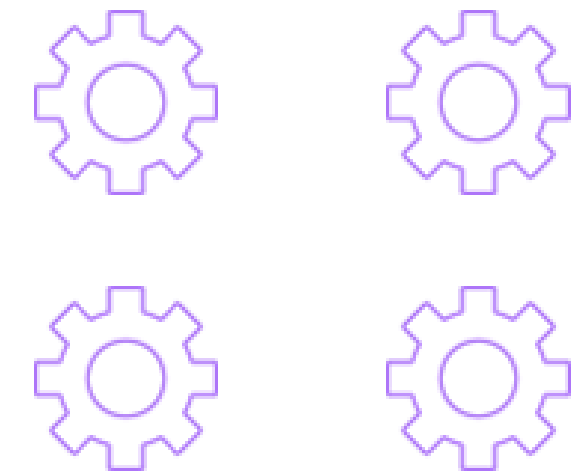
## Templates



Practice Stencils:  
"Go Gators!" And  
"there"



## Pressure Sensors



Corrects Writing  
Techniques



Koziatsek, S. M., & Powell, N. J. (2003). Pencil Grips, legibility, and speed of fourth-graders' writing in cursive. *The American Journal of Occupational Therapy*, 57(3), 284–288. <https://doi.org/10.5014/ajot.57.3.284>

(G. Moore, personal communication, March 15, 2023)





# Background Research



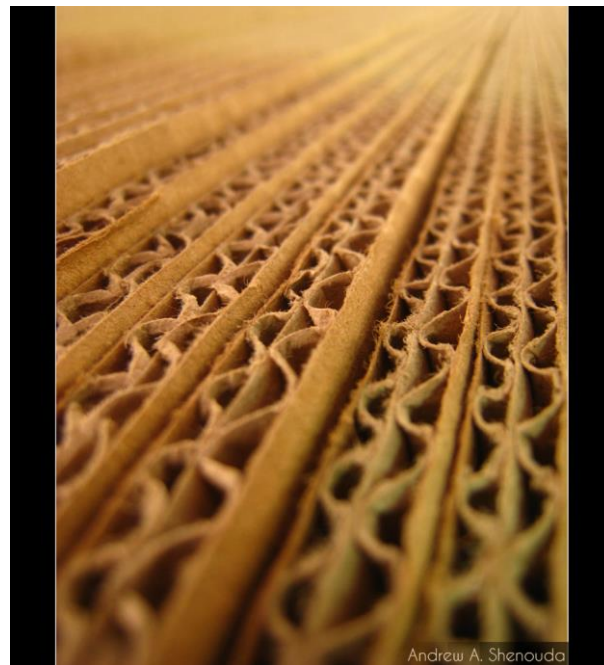
- Children's struggles with handwriting and using too much pressure.
- Lateral pencil quadrupod grip





# ●●● Ethical/Environmental Considerations

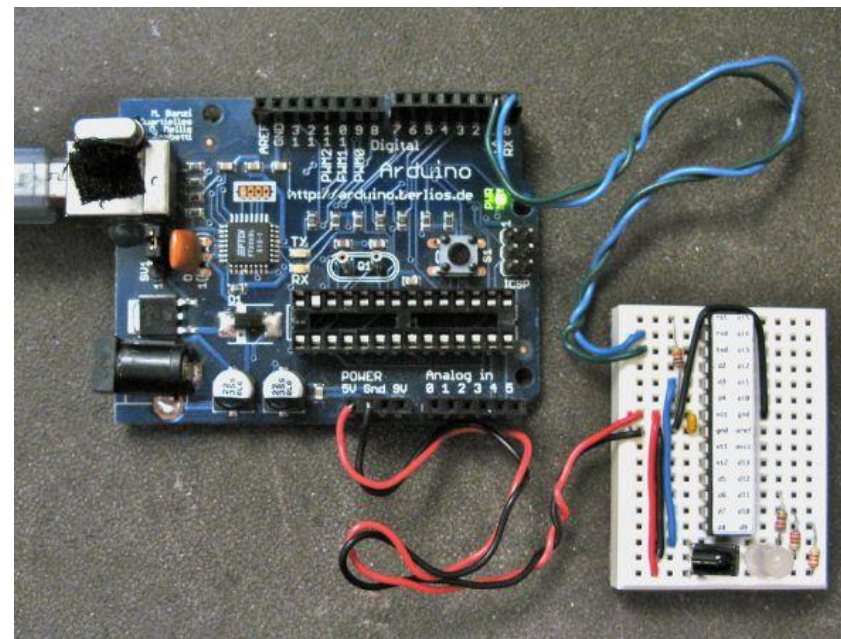
## Materials



Wood/Cardboard

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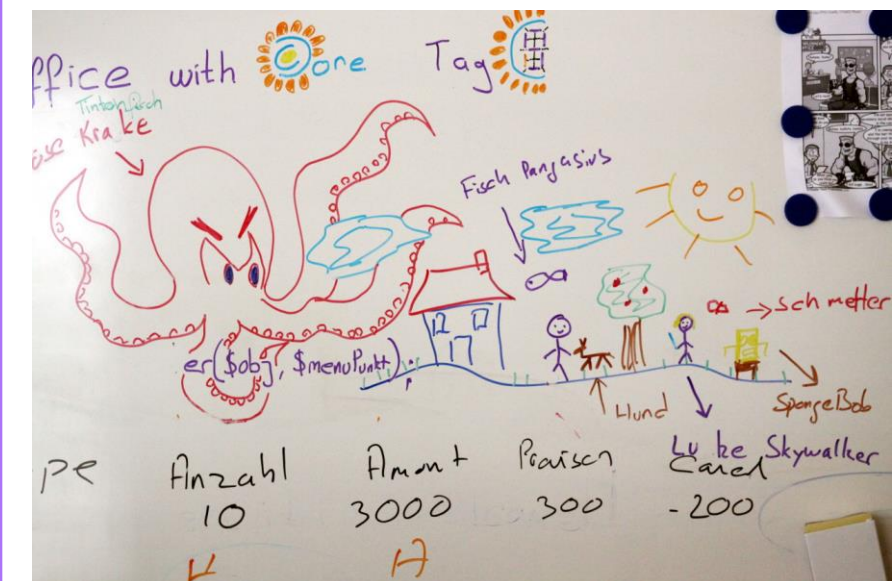
## Manufacturing



Mostly ethical

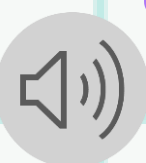
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## Concerns



Whiteboard

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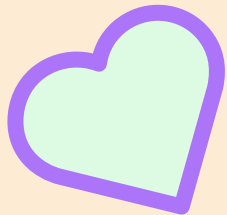
## Design Justifications

Attributes	Attribute Weights	"Handwriting Helper" (out of 10)	Weighted Score	"Smart Cup Stacker" (out of 10)	Weighted Score
Safety	0.1	6	0.6	8	0.8
Effectiveness	0.4	10	4.0	9	3.6
Low-Cost	0.1	9	0.9	8	0.8
Durability	0.2	8	1.6	9	1.8
Ease of Use	0.2	10	2.0	8	1.6
<b>Total</b>	<b>1.00</b>		<b>9.1</b>		<b>8.6</b>

*Design Decision Matrix*

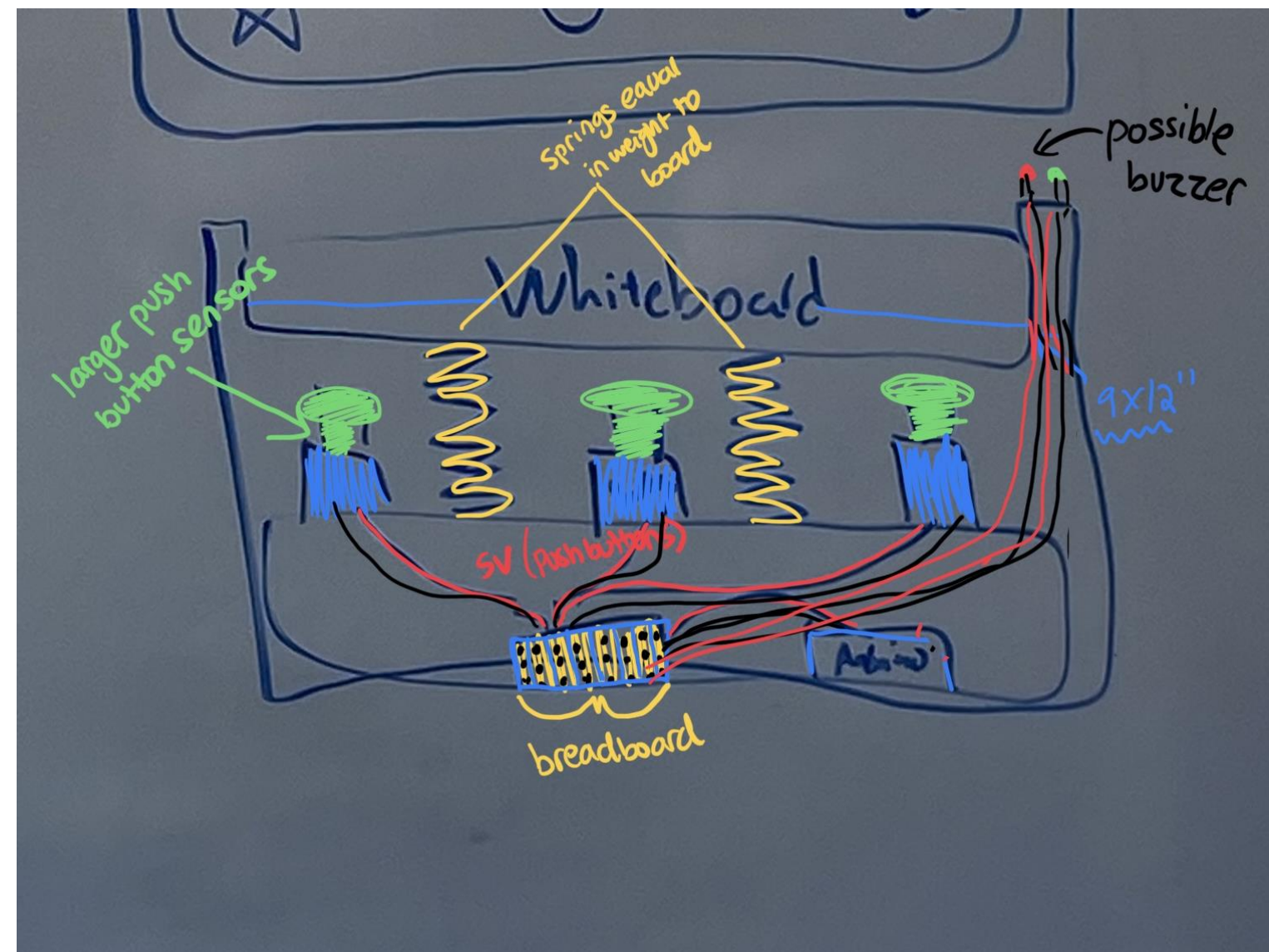
### Summary:

- Aids in child handwriting development
- Easy to determine functionality of toy
- Durable and easy to make at a low cost
- Safe to use

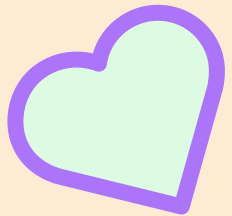




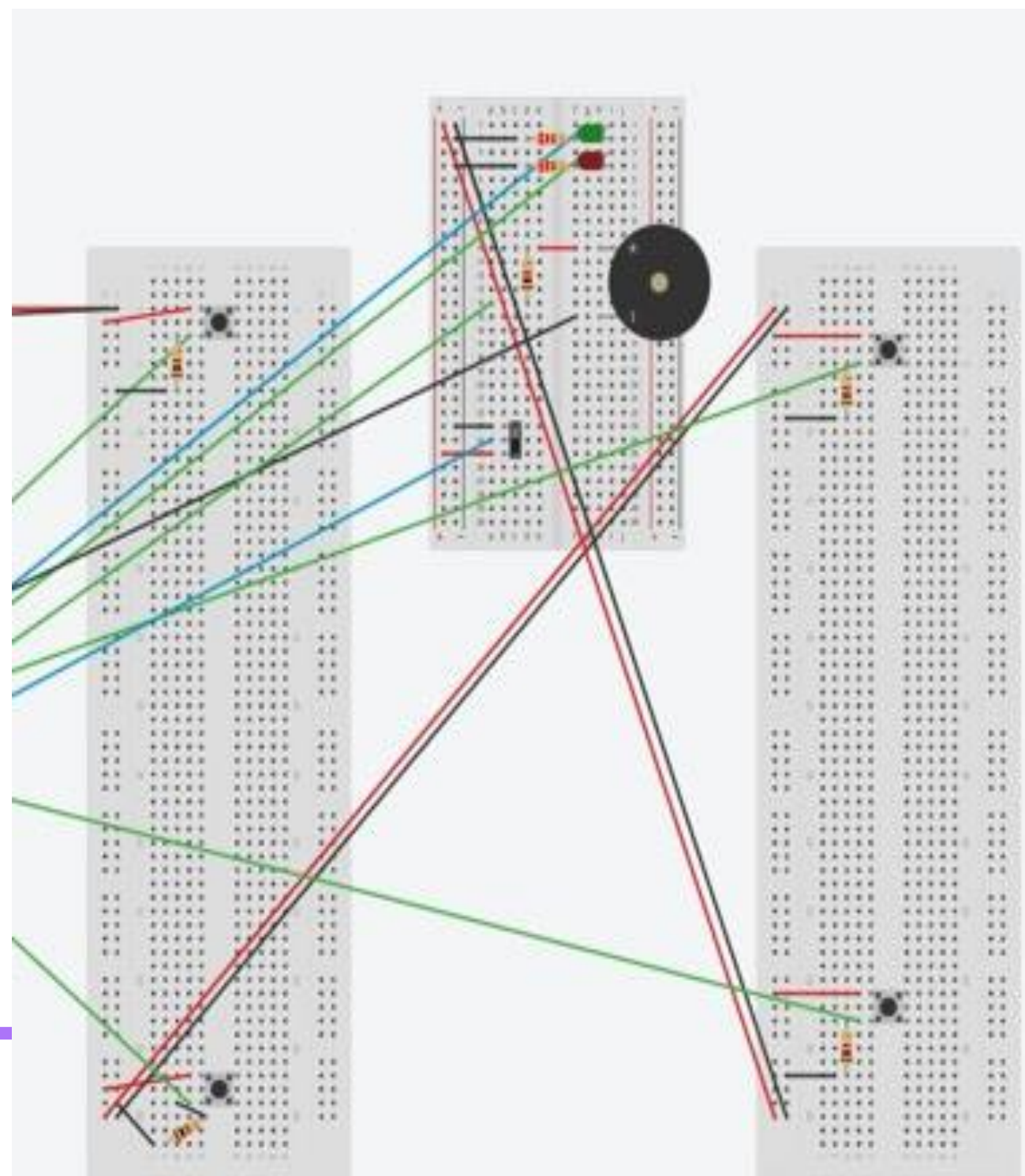
# Design Process



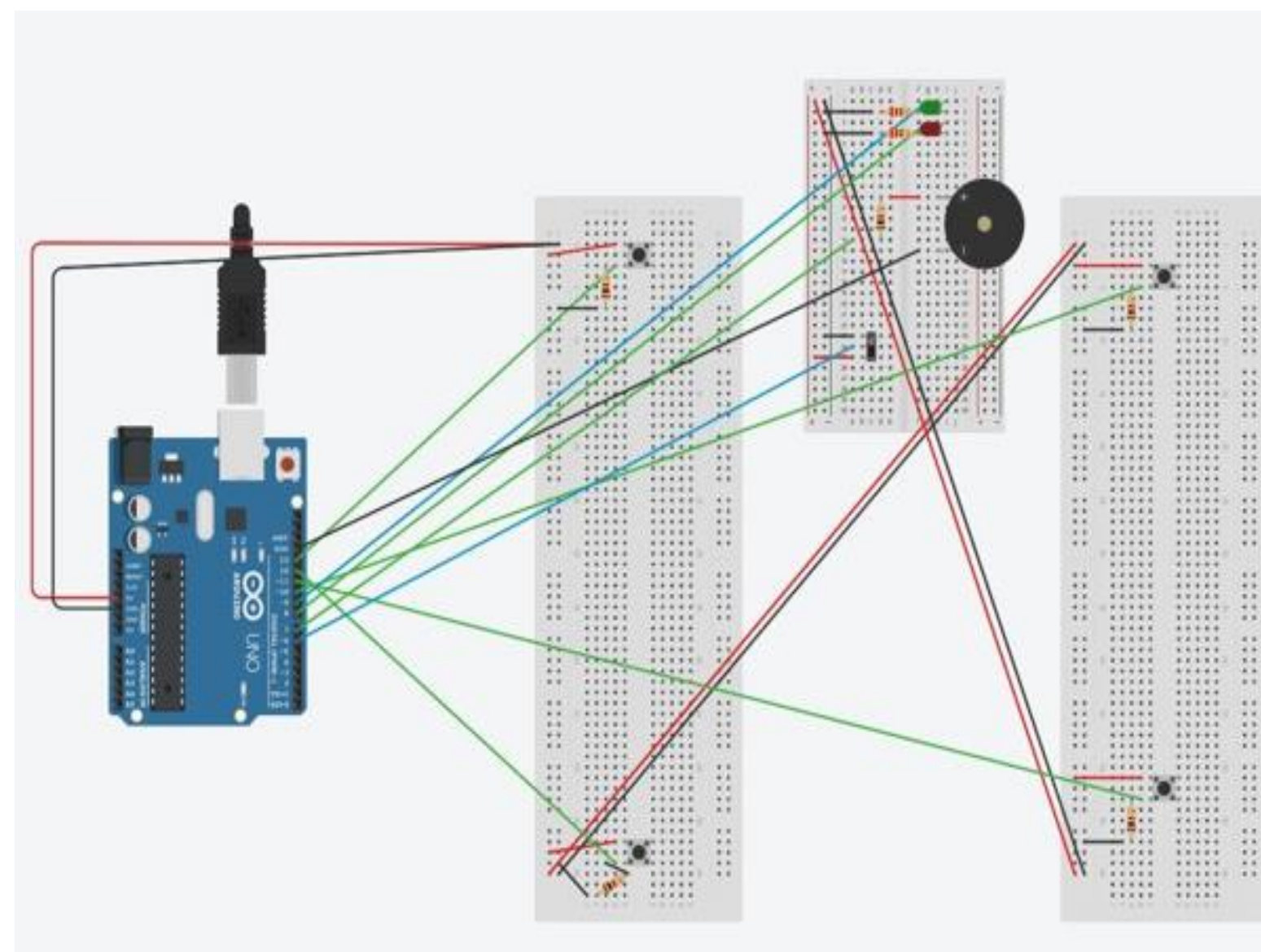
- Research end user
- Brainstorm ideas
- Decide on idea (justifications)
- Concept sketches
  - 3D parts
  - Arduino





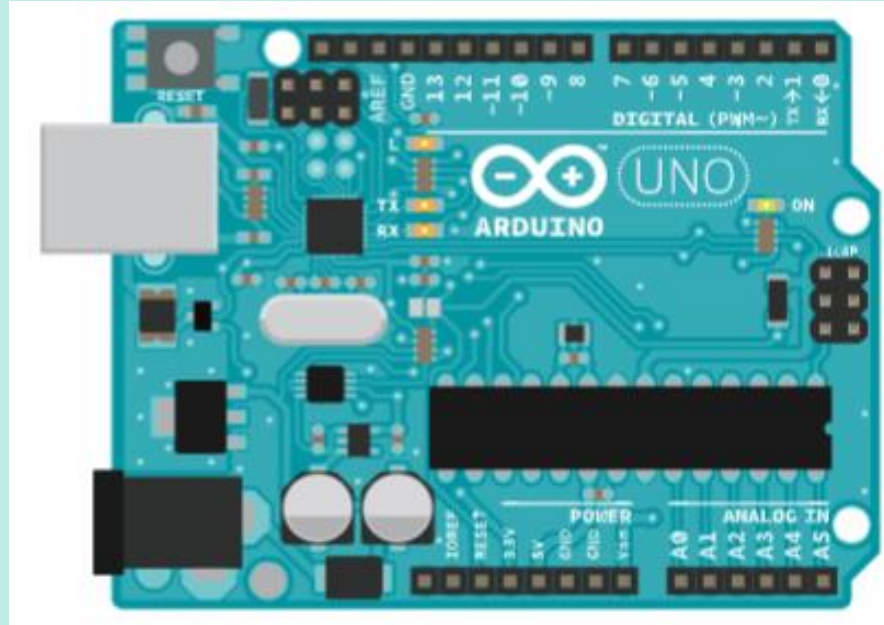


# Tinkercad

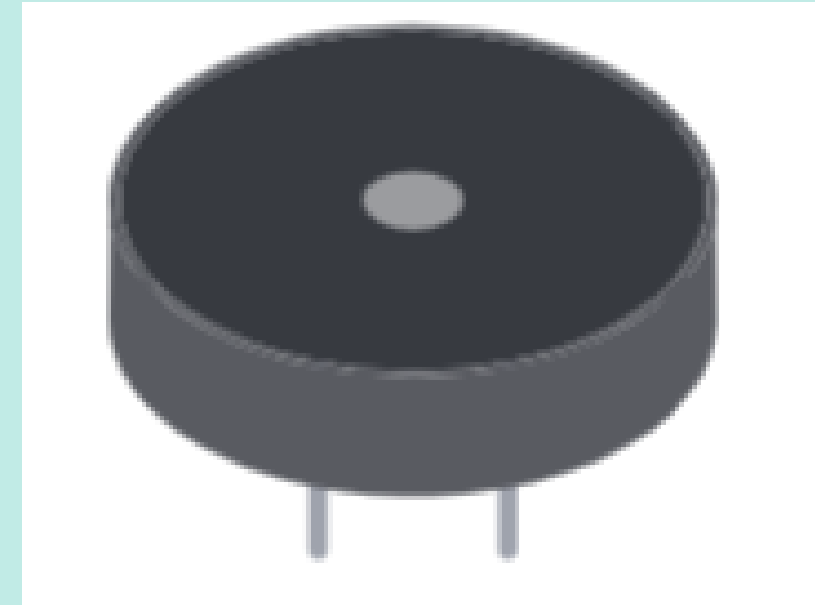




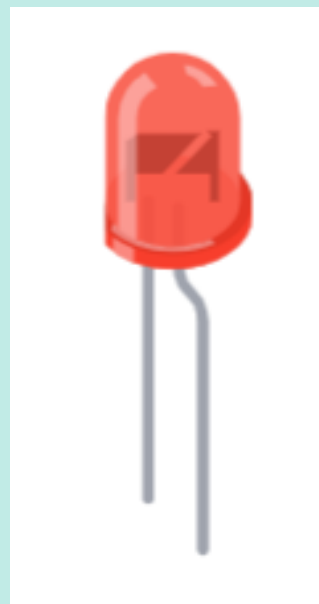
1 Arduino Uno



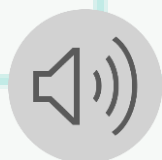
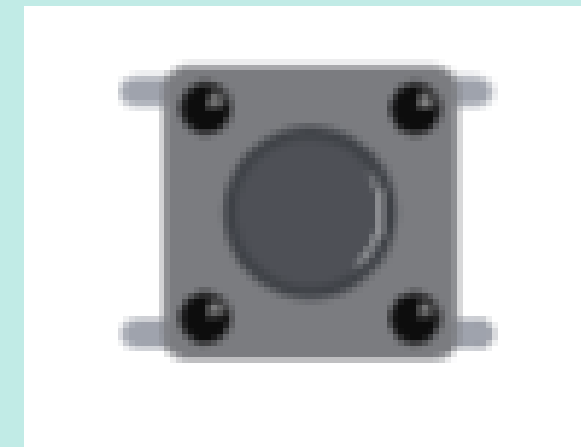
1 Piezo Sensor



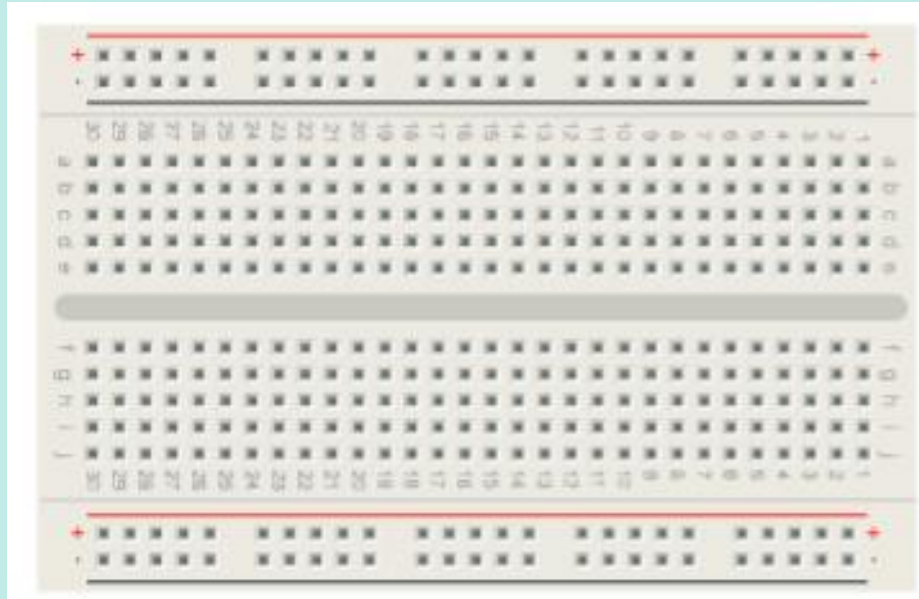
1 Red LED and 1 Green LED



4 Push Buttons



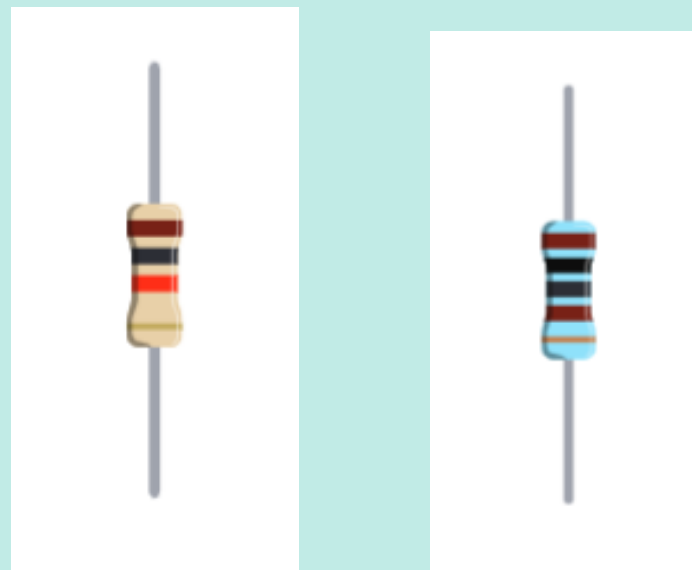
### 3 Breadboards



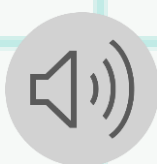
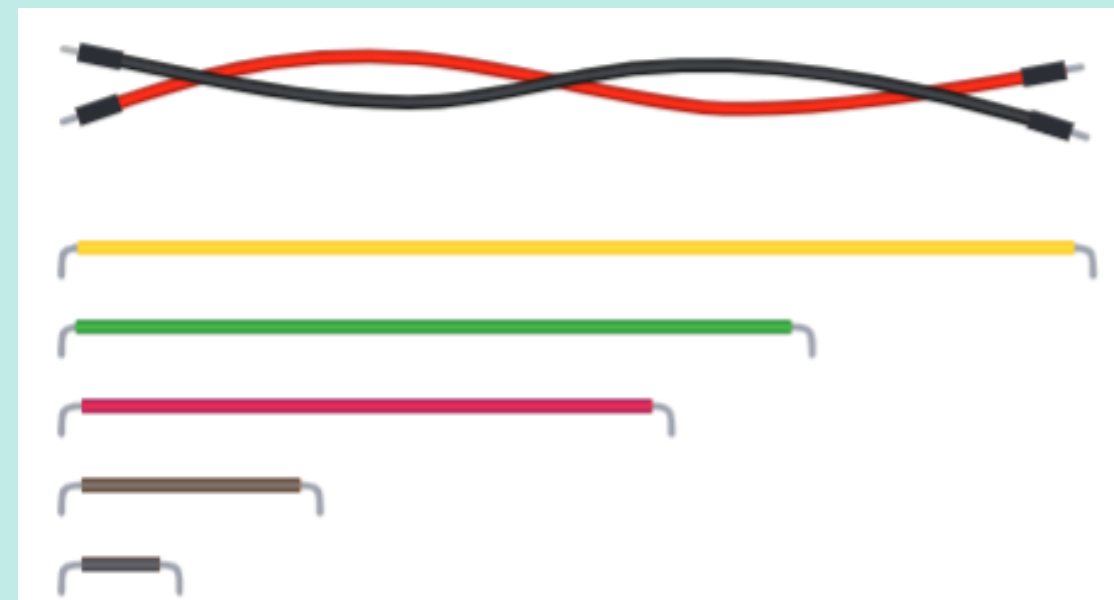
### 1 slide switch



### 4 1k $\Omega$ and 2 220 $\Omega$ Resistors

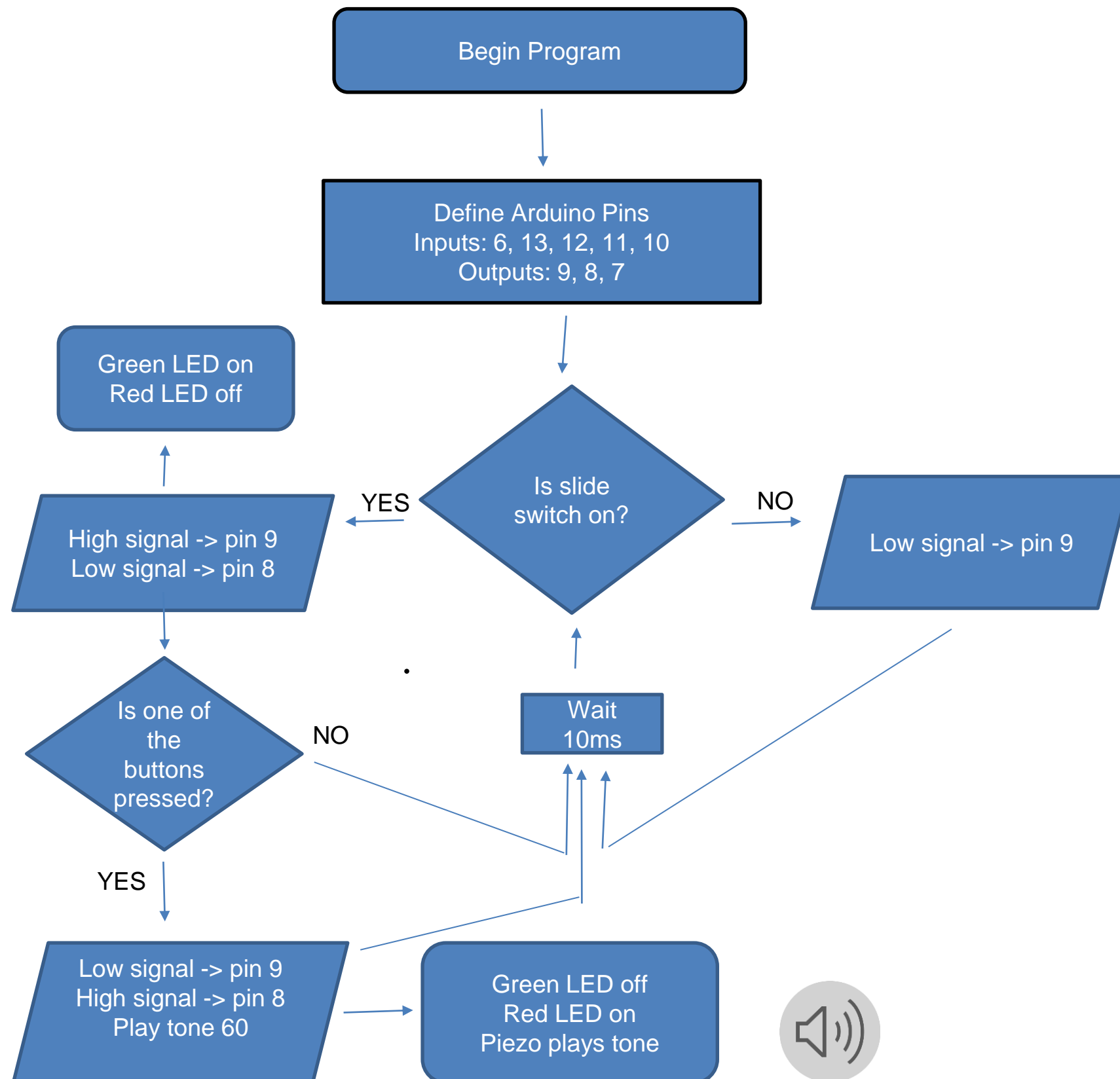


### Jumper Wires





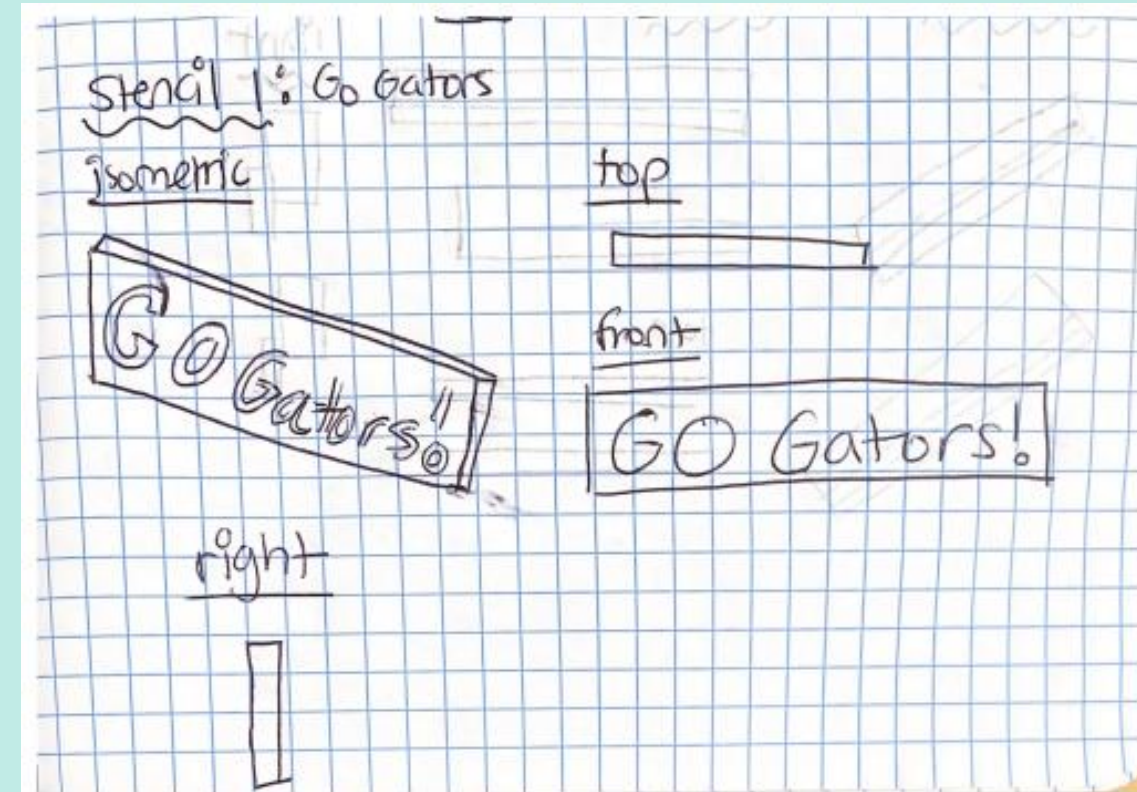
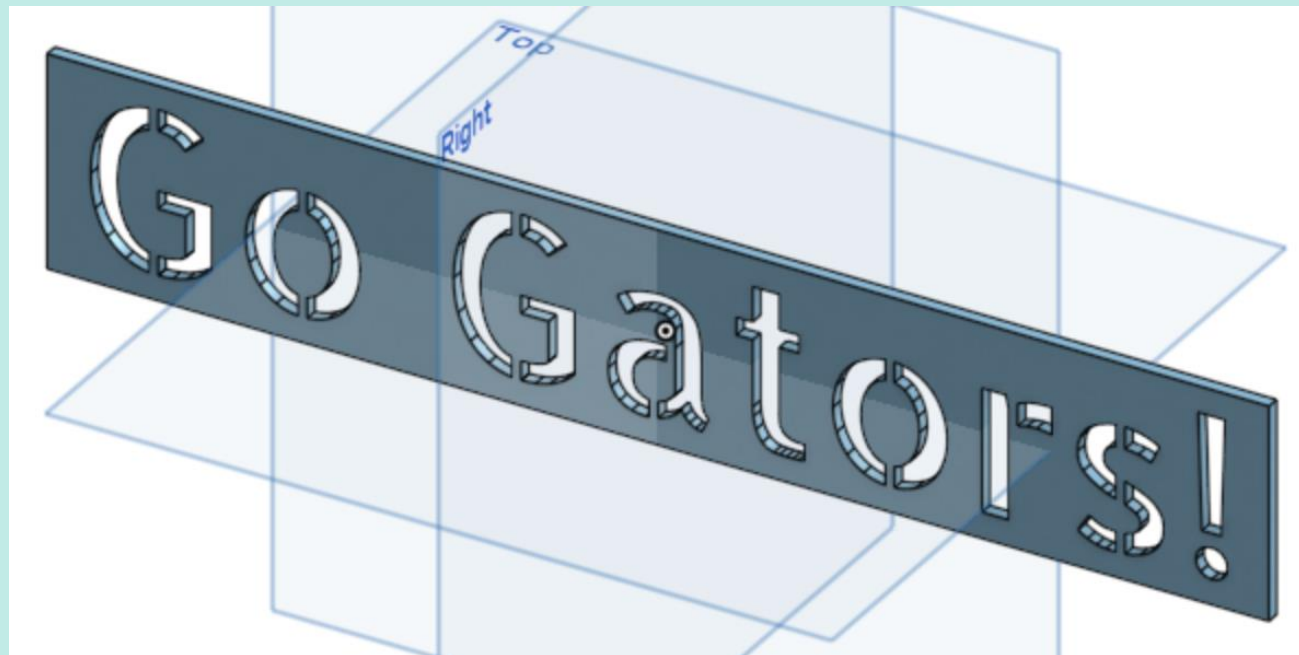
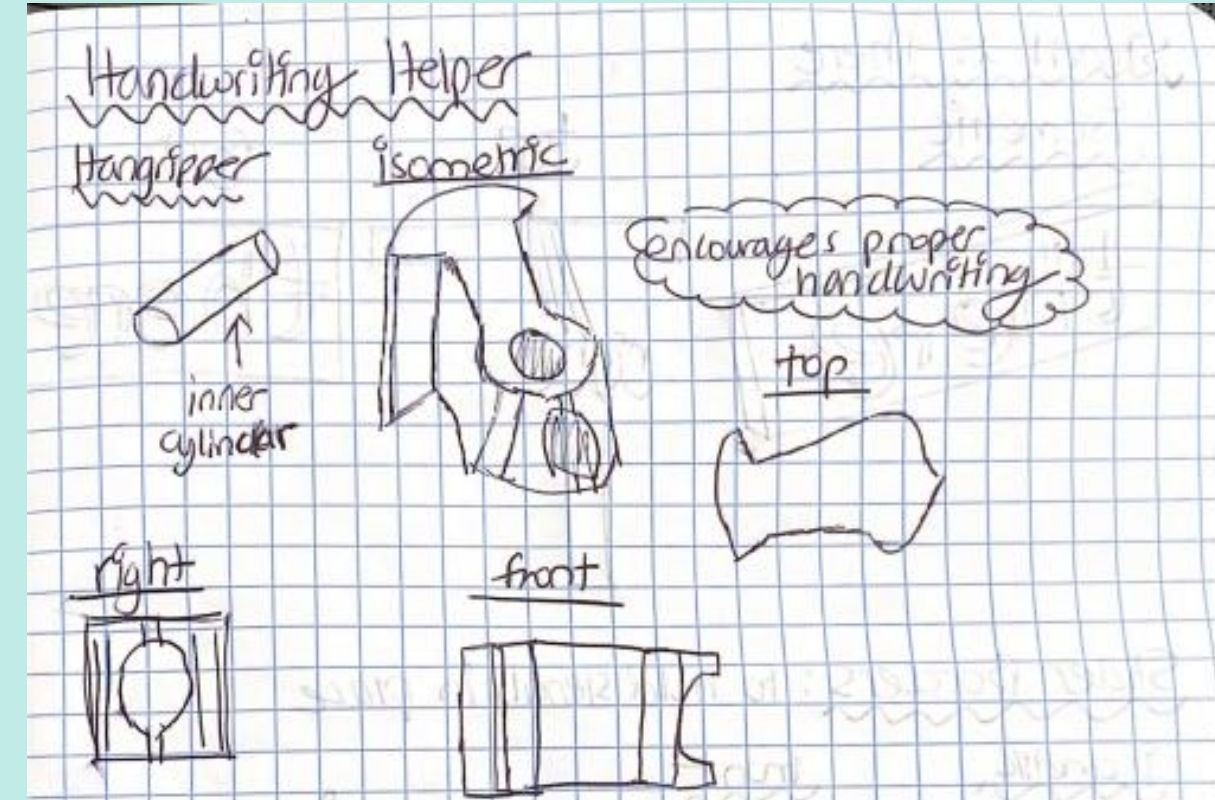
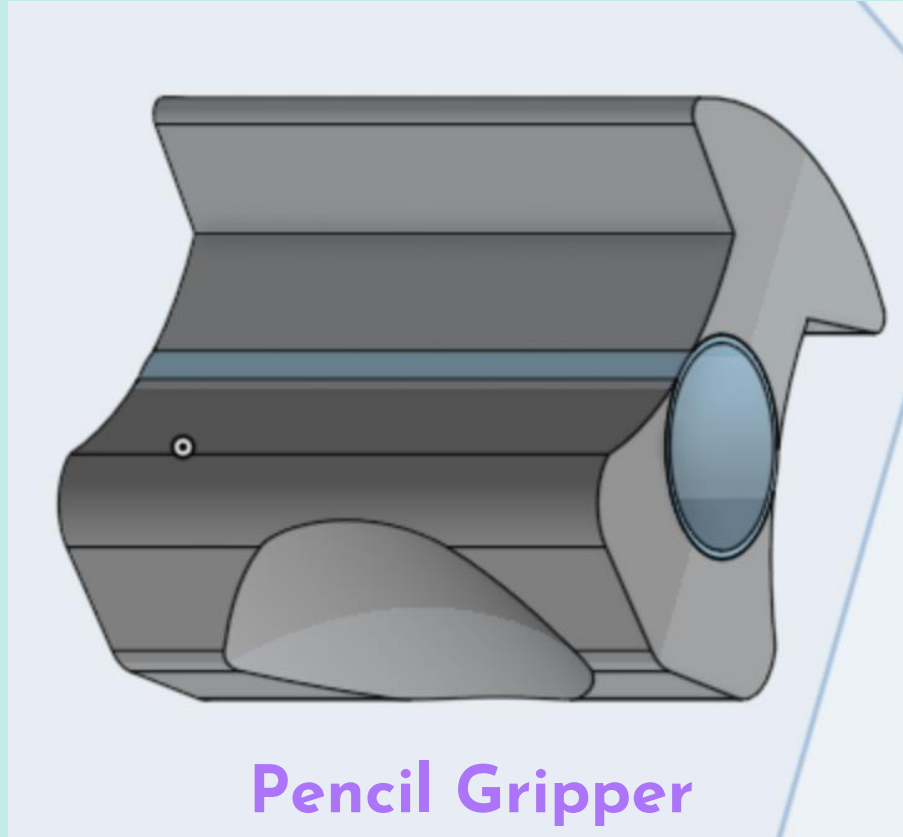
# Code Flowchart



```
// C++ code
// set ups the pins
void setup()
{
  pinMode(6, INPUT);
  pinMode(9, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(13, INPUT);
  pinMode(7, OUTPUT);
  pinMode(12, INPUT);
  pinMode(11, INPUT);
  pinMode(10, INPUT);
}
```

```
void loop()
{
  // the if statement that depends on the slide switch
  if (digitalRead(6) == HIGH) {
    digitalWrite(9, HIGH); // green light on
    digitalWrite(8, LOW); // red light off
    // four if statements, one for each button
    if (digitalRead(13) == HIGH) {
      digitalWrite(9, LOW); // green light off
      digitalWrite(8, HIGH); // red light on
      tone(7, 420, 200); // play tone 80 (C5 = 523 Hz)
    }
    if (digitalRead(12) == HIGH) {
      digitalWrite(9, LOW); // green light off
      digitalWrite(8, HIGH); // red light on
      tone(7, 420, 200); // play tone 60 (C5 = 523 Hz)
    }
    if (digitalRead(11) == HIGH) {
      digitalWrite(9, LOW); // green light off
      digitalWrite(8, HIGH); // red light on
      tone(7, 420, 200); // play tone 60 (C5 = 523 Hz)
    }
    if (digitalRead(10) == HIGH) {
      digitalWrite(9, LOW); // green light off
      digitalWrite(8, HIGH); // red light on
      tone(7, 420, 200); // play tone 60 (C5 = 523 Hz)
    }
  } else {
    digitalWrite(9, LOW); // green light off (red light also off)
  }
  delay(10); // Delay a little bit to improve simulation performance
}
```

# Solid Modeled Parts

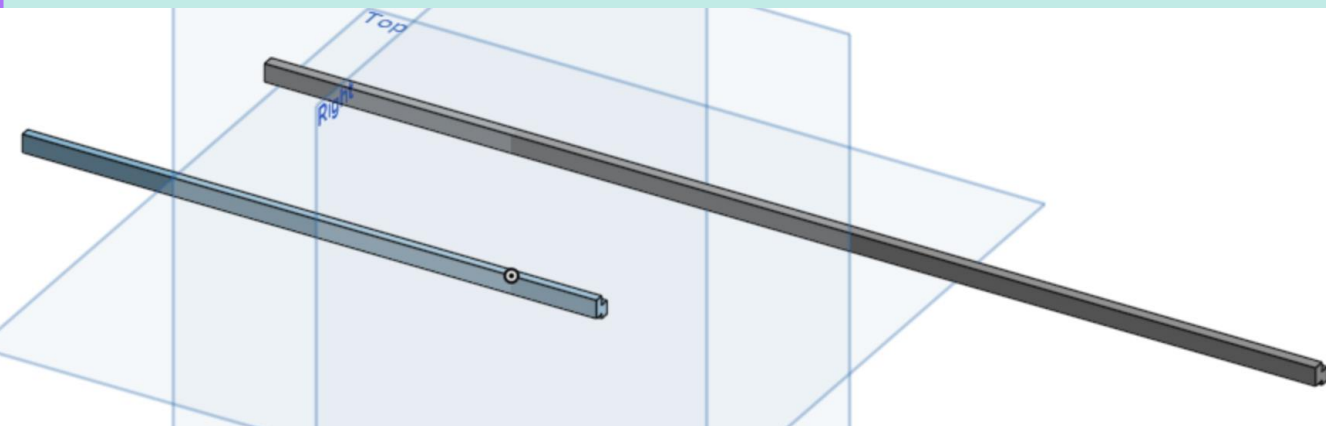
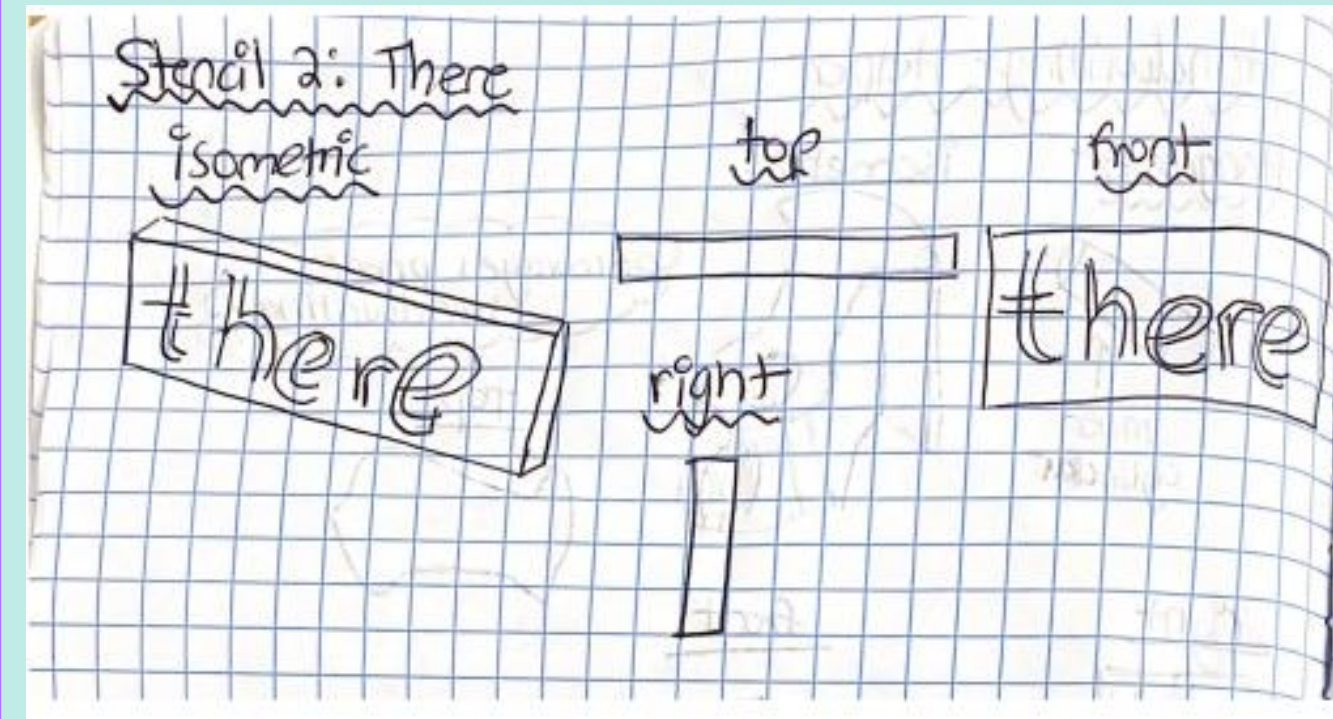




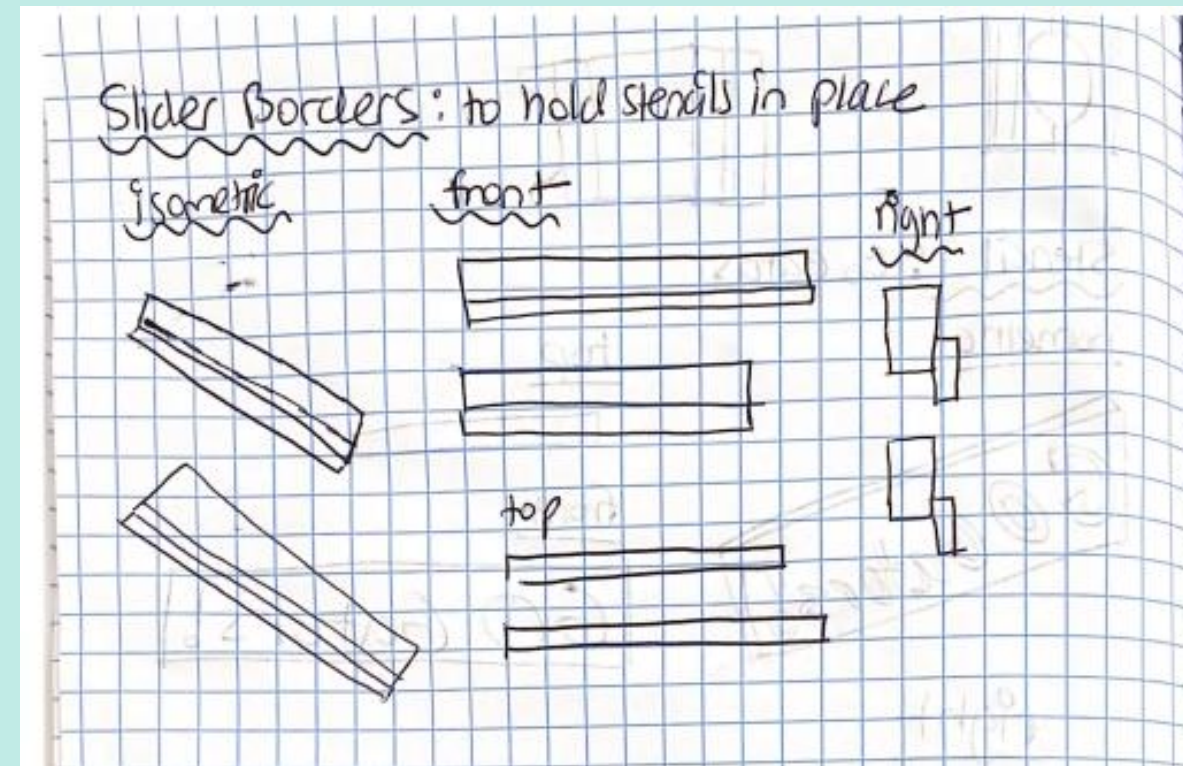
# Solid Modeled Parts



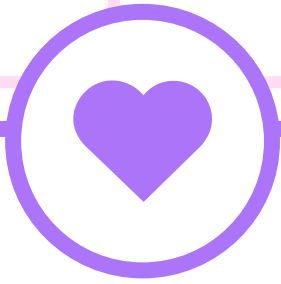
there stencil



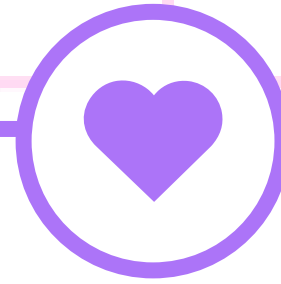
Stencil Holders



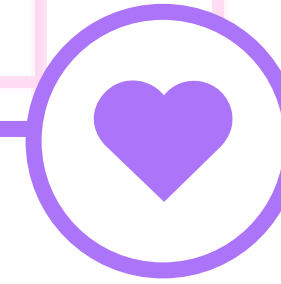
# Design Limitations



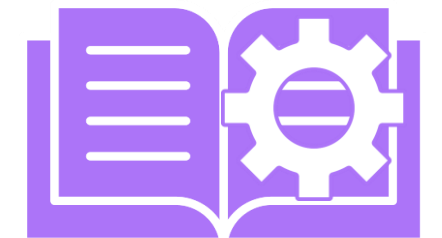
- Whiteboard and buttons
- 3D printed parts-  
Handgripper



- Portable
- Durability
- Waterproof



- Springs
- Optimal pressure



# References



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Koziatek, S. M., & Powell, N. J. (2003). Pencil Grips, legibility, and speed of fourth-graders' writing in cursive. *The American Journal of Occupational Therapy*, 57(3), 284–288. <https://doi.org/10.5014/ajot.57.3.284>

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Fitzgerald, S. (n.d.). *Arduino Projects Book*. Electronics in Touch Co. Retrieved April 18, 2023, from [https://www.eitkw.com/wp-content/uploads/2020/03/Arduino\\_Projects\\_Book.pdf](https://www.eitkw.com/wp-content/uploads/2020/03/Arduino_Projects_Book.pdf)

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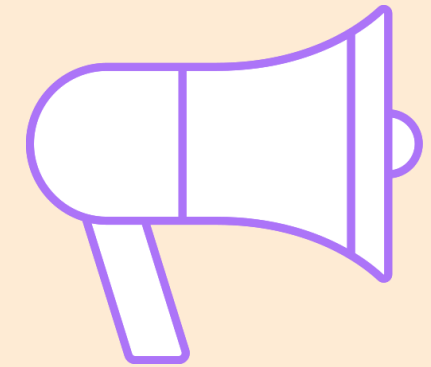
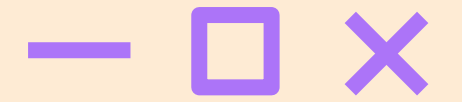
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Thank you!!!!

