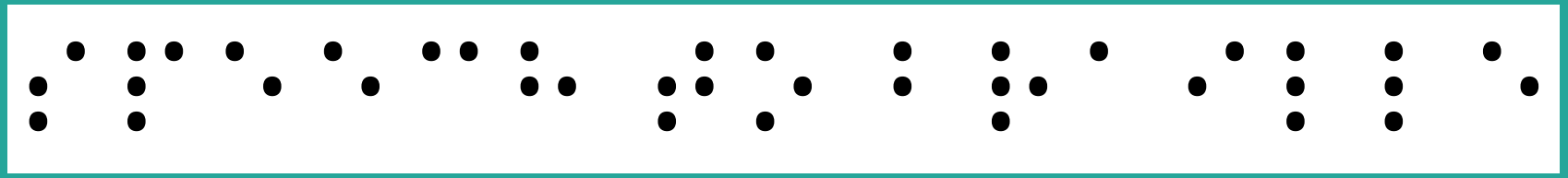

A wearable Speech to Braille device

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Hack and Build, Fall 2024

Problem

1) **If you are losing your sight, how do you re-learn how to read with Braille?**
2) **Is there an easy way for deaf-blind individuals to communicate and receive speech?**

In 2020, there were 1.1 billion people living with vision loss. There were between 45,000 - 50,000 individuals in the US who have hearing impairment and vision loss.

Solution - A wearable Speech to Braille Device

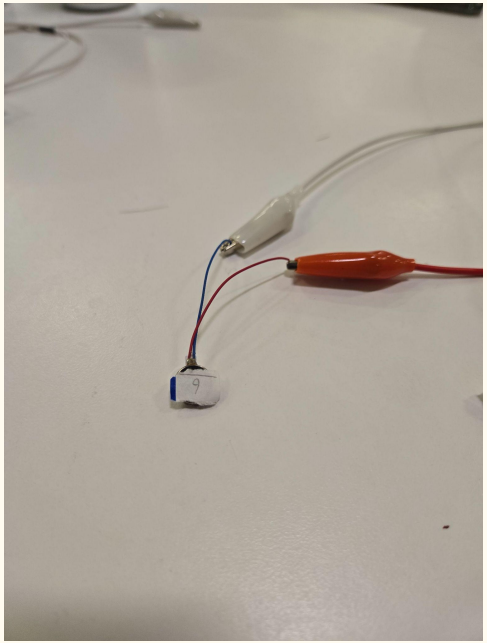
We propose a wearable device to easily teach Braille!

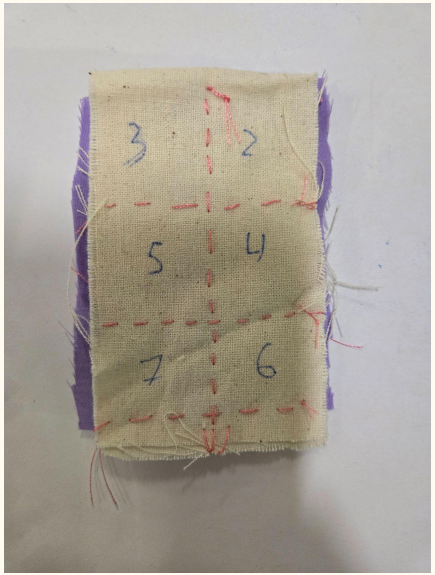
When reading English, we often hear the sounds out in our head.

The device takes in speech for easy input, and uses a 3 x 2 vibration motor array to display the Braille, while also outputting the letter spoken out on the laptop.

We use vibration motors in a 3 x 2 array.

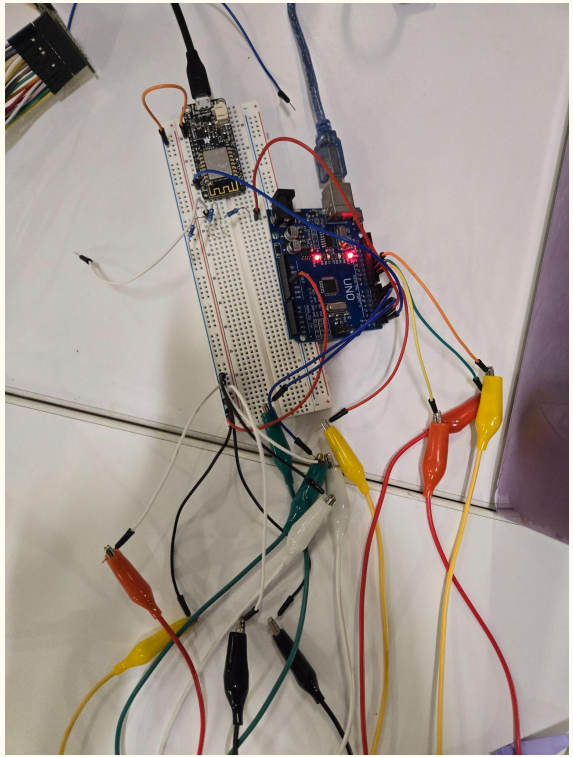
Six motors are connected in a 3 x 2 array to match a Braille array. The vibrations go off depending on what letters are being represented.





We process speech to text, and text to braille.

We take in and process speech on our laptop, using **Whisper.** This is converted to a txt and sent to our Arduino.



The device is wearable (and cute)!

While the prototype is much larger than intended, the user can slip two fingers into the sleeve to feel the 3 x 2 vibration array to feel the Braille.

Next Steps

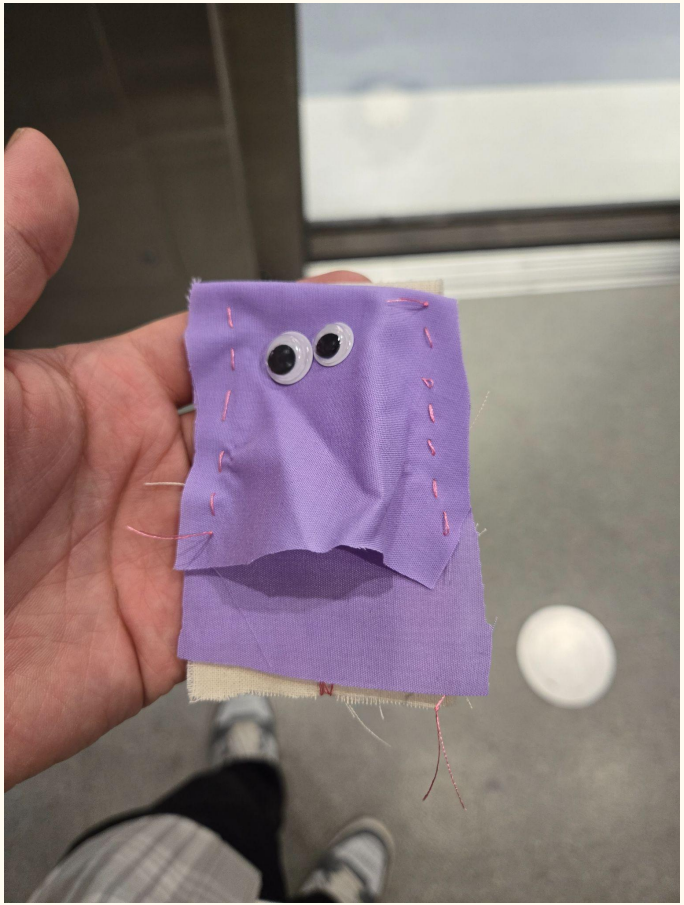
- A new version would likely look similar, but soldered, and less flimsy.
- We will have to do more research on haptics and perceiving haptics to make the device more “accurate” and sensible to users.
- This will involve using more precise and smaller vibration motors or haptics.
- We want to change the voice to not say letters, but say words. This way, users can attach certain Braille patterns to common words (as many of us read English).
- We also need better wireless integration!

Try it out!

Step 1: Place two fingers in the sleeve.

Step 2: Say a word into the microphone or laptop.

Step 3: Feel the braille!



Hackathon Constraints

We were given the time frame of the hackathon (under 24 hours) to complete this hack.

We needed to breadboard all the materials to return it at the conclusion of the Hackathon.

Related Work

VBraille uses haptics in a smartphone to display Braille. It partitions the screen into a 3 x 2 array, and can be used for smartphone games to teach young kids Braille. [Link]

HaptiRead is a device that uses mid air haptics to display Braille. It is a small, portable device with applications including signs in public places. [Link]

Thanks!

Thanks to CURC for hosting Hack and Build!

Thank you to the judges for reviewing our work!

Thank you to all the Hack and Build sponsors!

Thanks to ChatGPT!