A Novel Approach to Digital Media Accessibility for Visually Impaired People

CEO Megan Ashun, CMO Edward Goodwin, CTO Rishab Nair, & CIO Jared Rosen
Advisors: Dr. Kevin Crowthers, Liz Myska | WPI Faculty Consultant: Aymon Langlois

PROBLEM STATEMENT

Visually impaired individuals **lack adequate access** to digital literature (Wei-Haas, 2017).

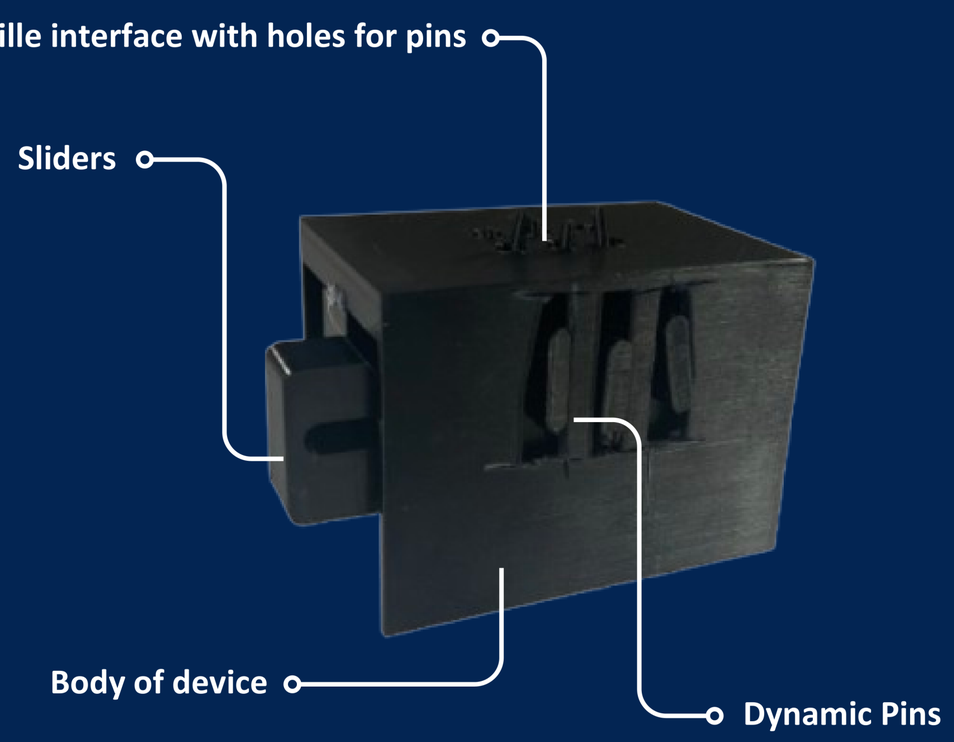
ENGINEERING GOAL

We aimed to create an **instantaneous** and **inexpensive** device that could convert online text to a ***physical Braille display***.

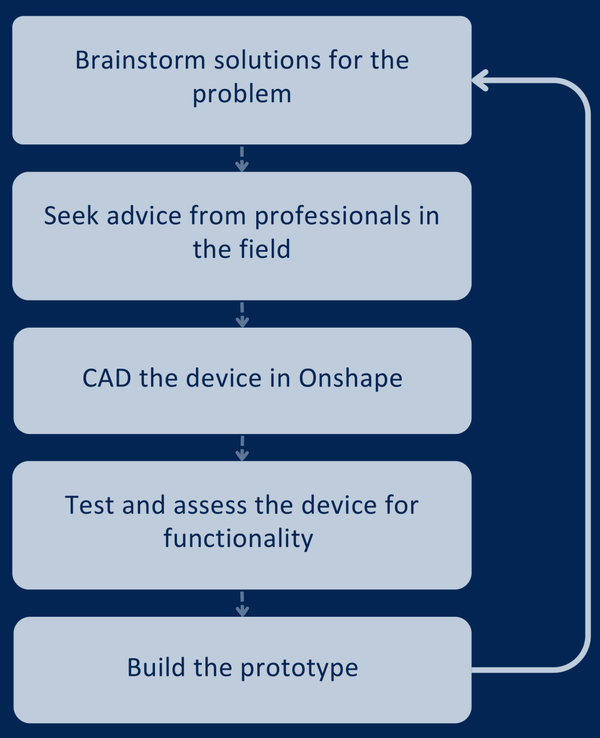
CURRENT DESIGN

The Braille Slider (Ver. II)

Level 1 Requirements	
1	The device produces accurate braille.
2	The device should efficiently change braille characters.
3	The device should meet the budget constraints set by the Massachusetts Academy of Math & Science.
4	The device should have an intuitive design.



METHODOLOGY



DESIGN II
The Braille Slider (Ver. I)

Pros
- Sliders provide stable braille configurations

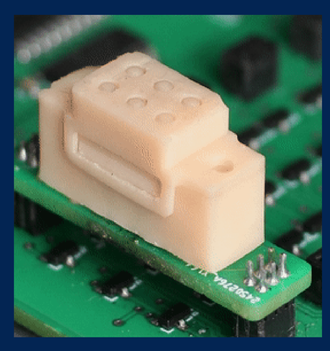
Cons
- Lower durability
- Gears get stuck at edges
- Motor functionality low

DESIGN III
Rotational Braille Wheel

Pros
- Compact

Cons
- Extra mechanisms needed
- Not precise
- Mechanism for keeping pins up needed

DESIGN IV
Electromechanical Braille Cell



Pros
- Extremely Compact
- Quick
- Reliable

Cons
- Very Costly
- Difficult to manufacture

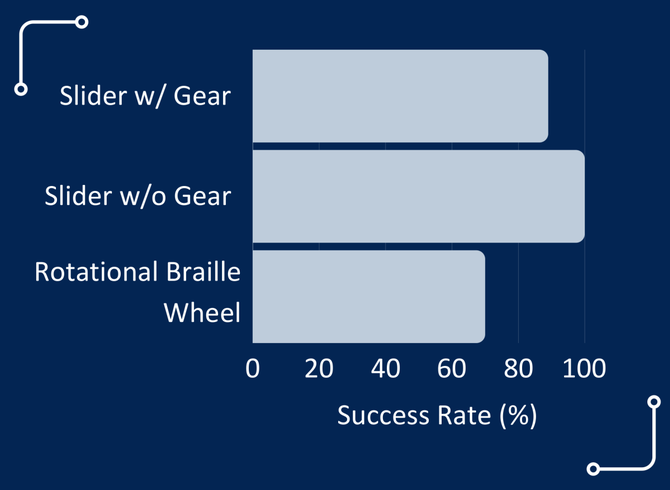
DESIGN STUDY I
Optimal Braille Production Method

Purpose: To determine which design best displays all Braille characters

Independent Variable: Design type

Dependent Variable: Average success rate of displaying Braille characters

Conclusion: The slider without the gear produces the most accurate Braille display ($p < 0.005$)



DESIGN STUDY II
Gear Angles

Purpose: To determine at which angle the gear is needed to be held for the Braille slider to produce the most accurate display

Independent Variable: Gear angle

Dependent Variable: Ability of the Braille slider to successfully and smoothly slide within the device

Conclusion: The slider is best able to move when the gear is coordinated at a angle of 10 degrees above the horizontal

CONCLUSIONS & FUTURE WORK

- Adjusting the location of the axel and the size of the gear would significantly improve this device's accuracy, as seen in the results of the design studies.
- This device could be significantly descaled using a more fine-tuned 3D printer to create a further inexpensive and accurate mass-producible prototype.