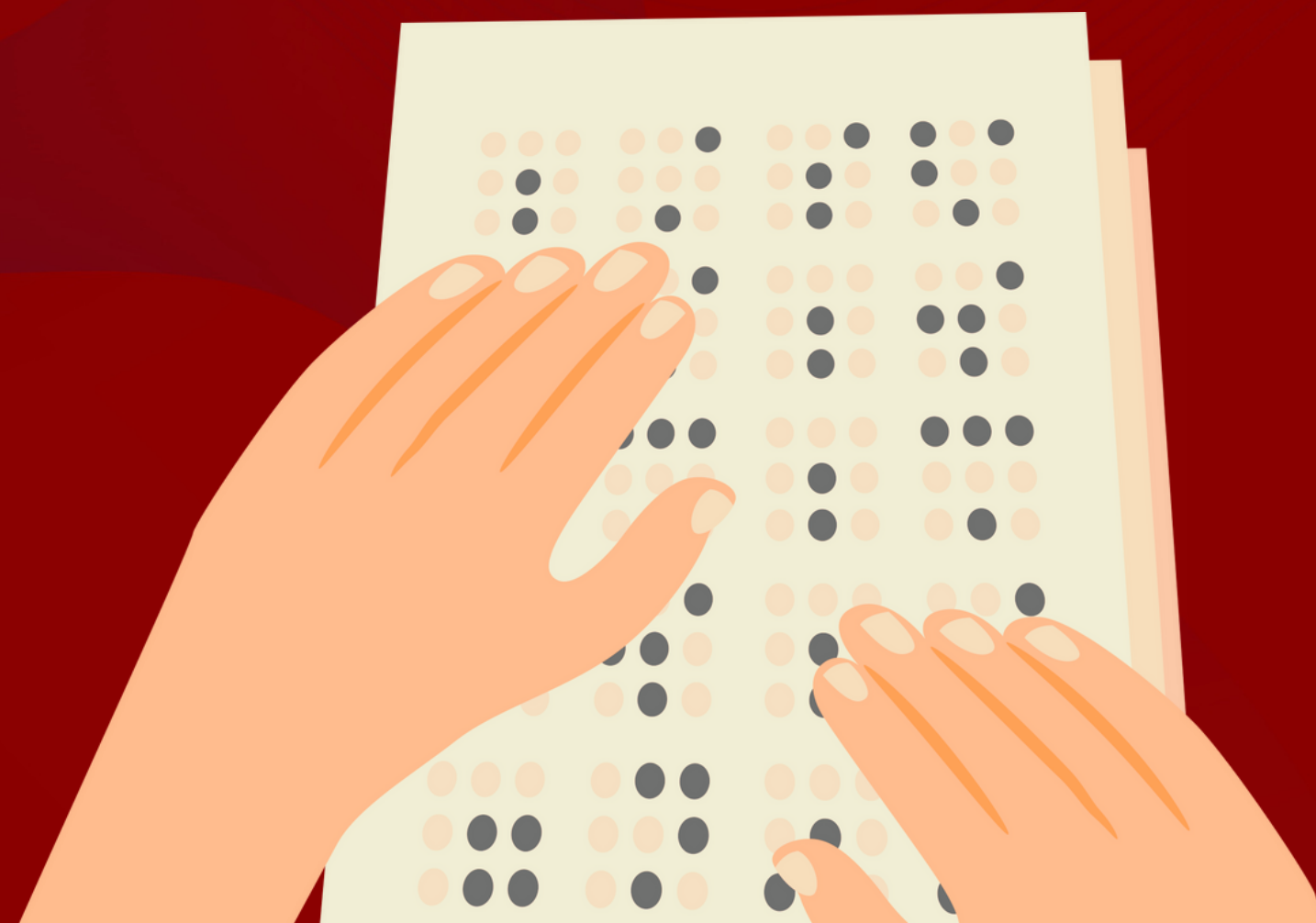


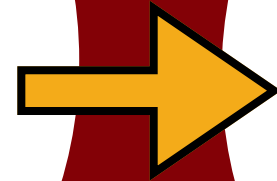
BraiLink

a solution to the braille printing problem



GLOBAL MARKET SIZE & CUSTOMER

\$356.9
MILLION
(2023)



\$564.6
MILLION
(2030 EST.)

**Compound Annual Growth
Rate: 5.9%**

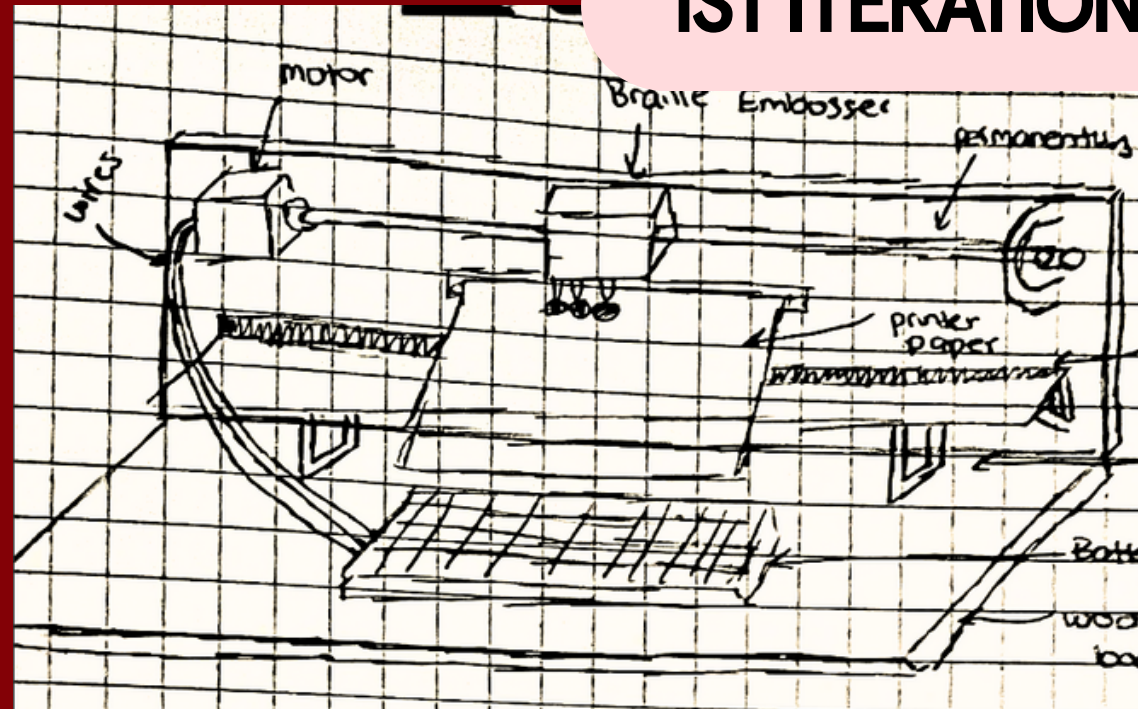
(The Insight Partners)

Ideal Customer

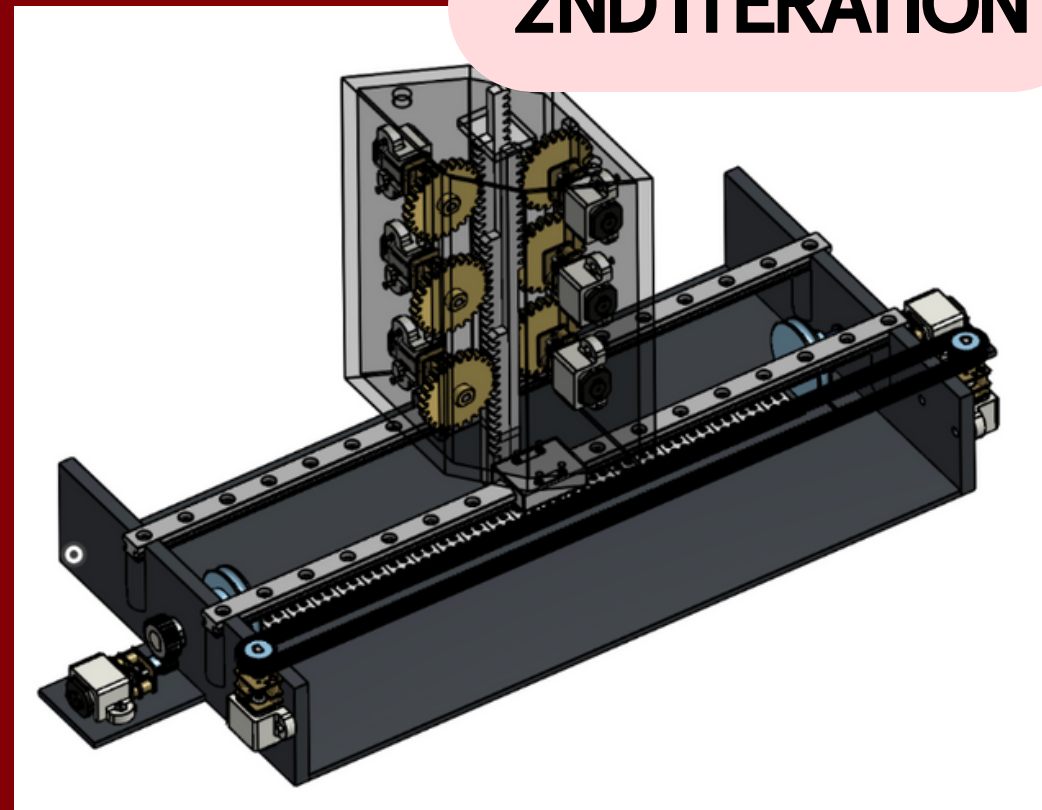
- Sighted users converting English to Braille
- Users with handwritten text needing Braille output
- Focus on affordability and efficiency

DESIGN ITERATIONS & FINAL DESIGN

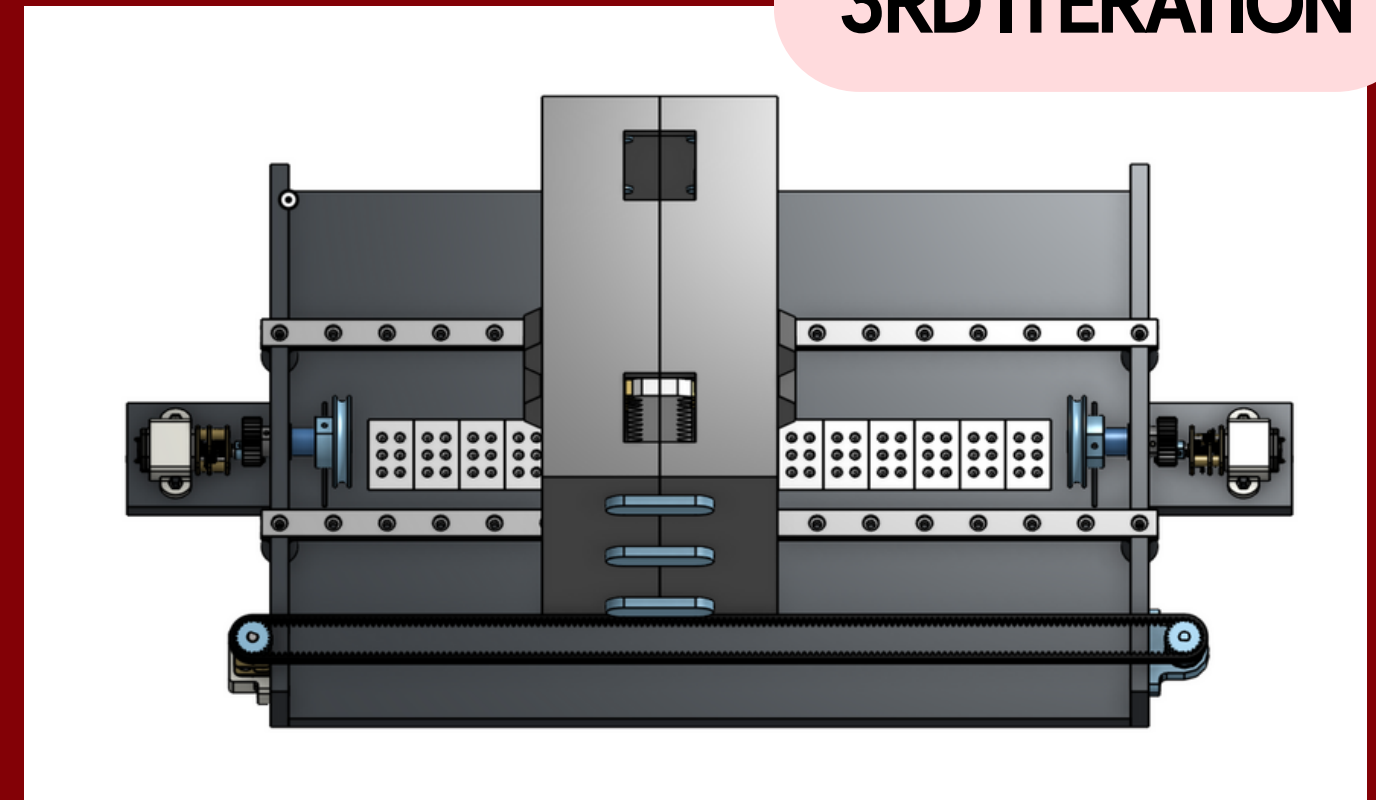
1ST ITERATION



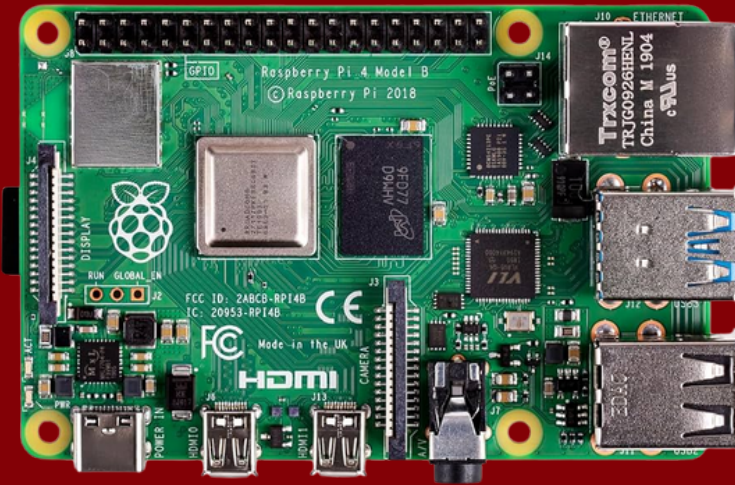
2ND ITERATION



3RD ITERATION



EECS TECHNOLOGIES



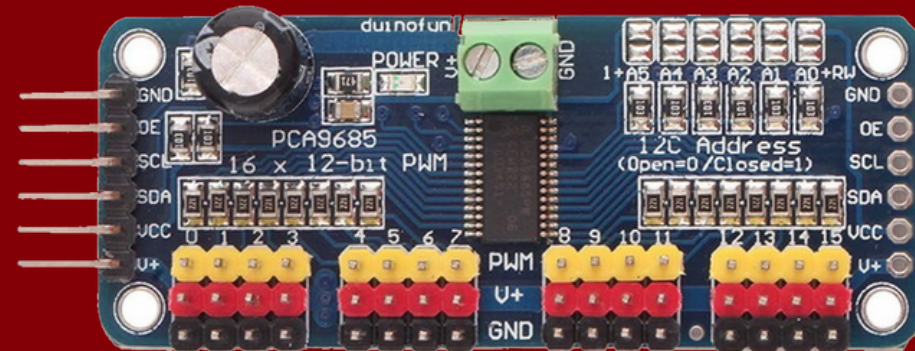
Raspberry Pi



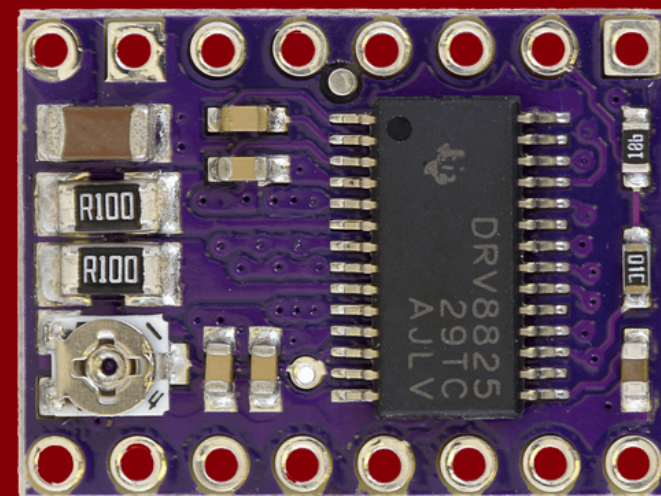
Servo Motors



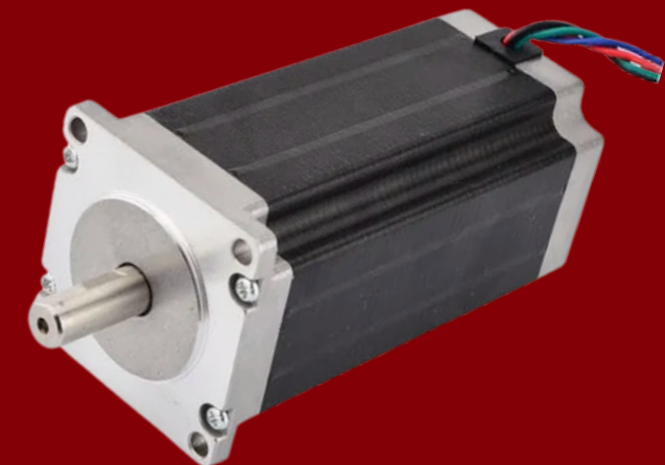
Breadboard



PCA9685



DRV8825

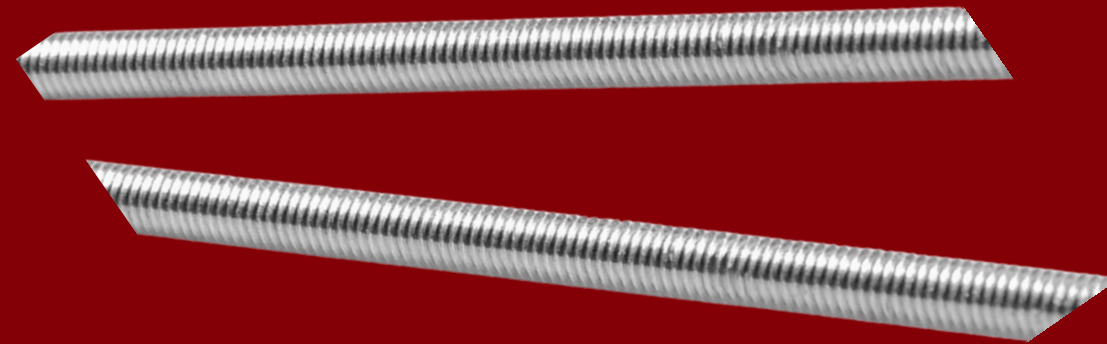


Stepper Motors

MCE TECHNOLOGIES



3D Printer

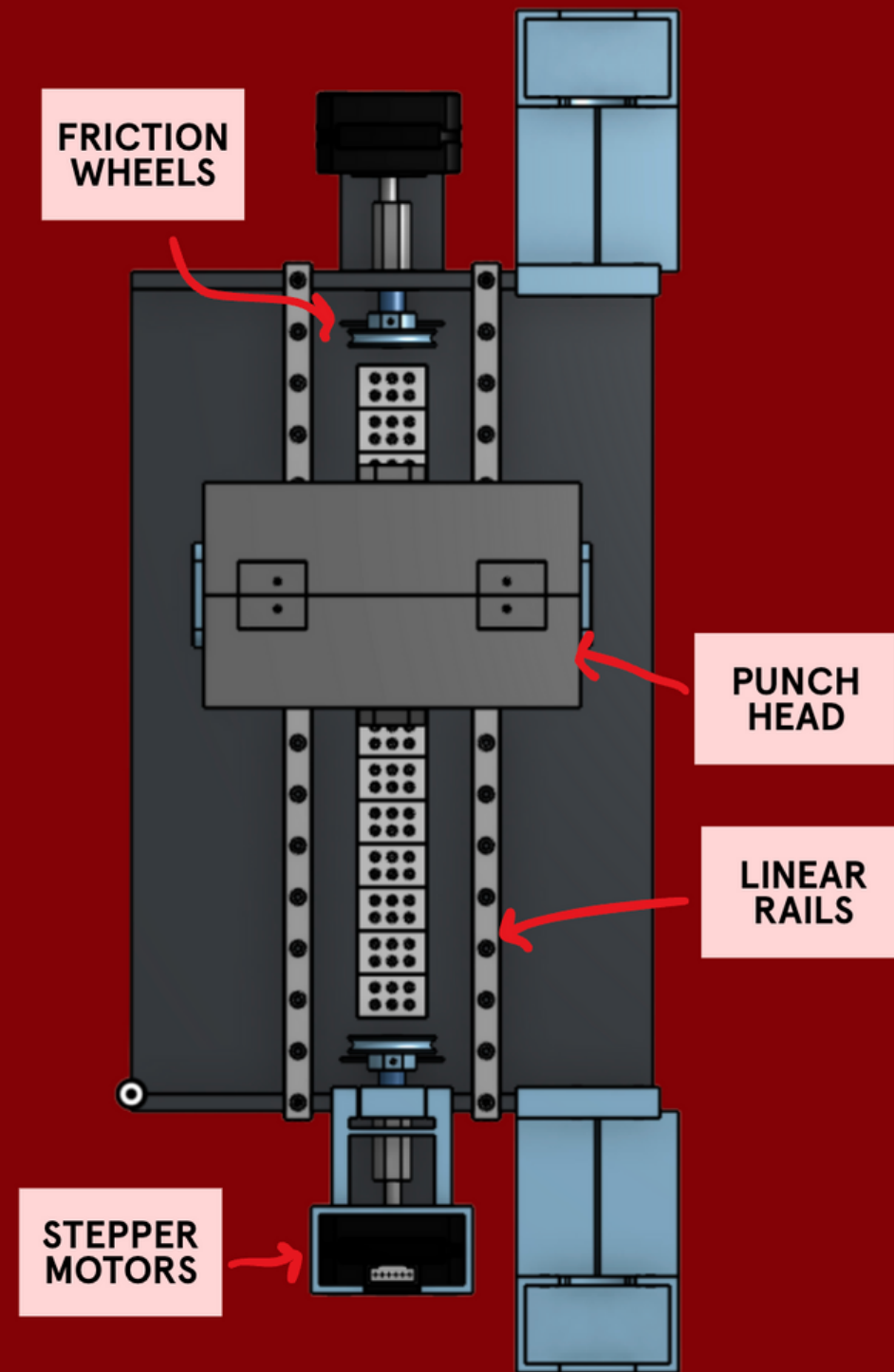


Threaded Rods

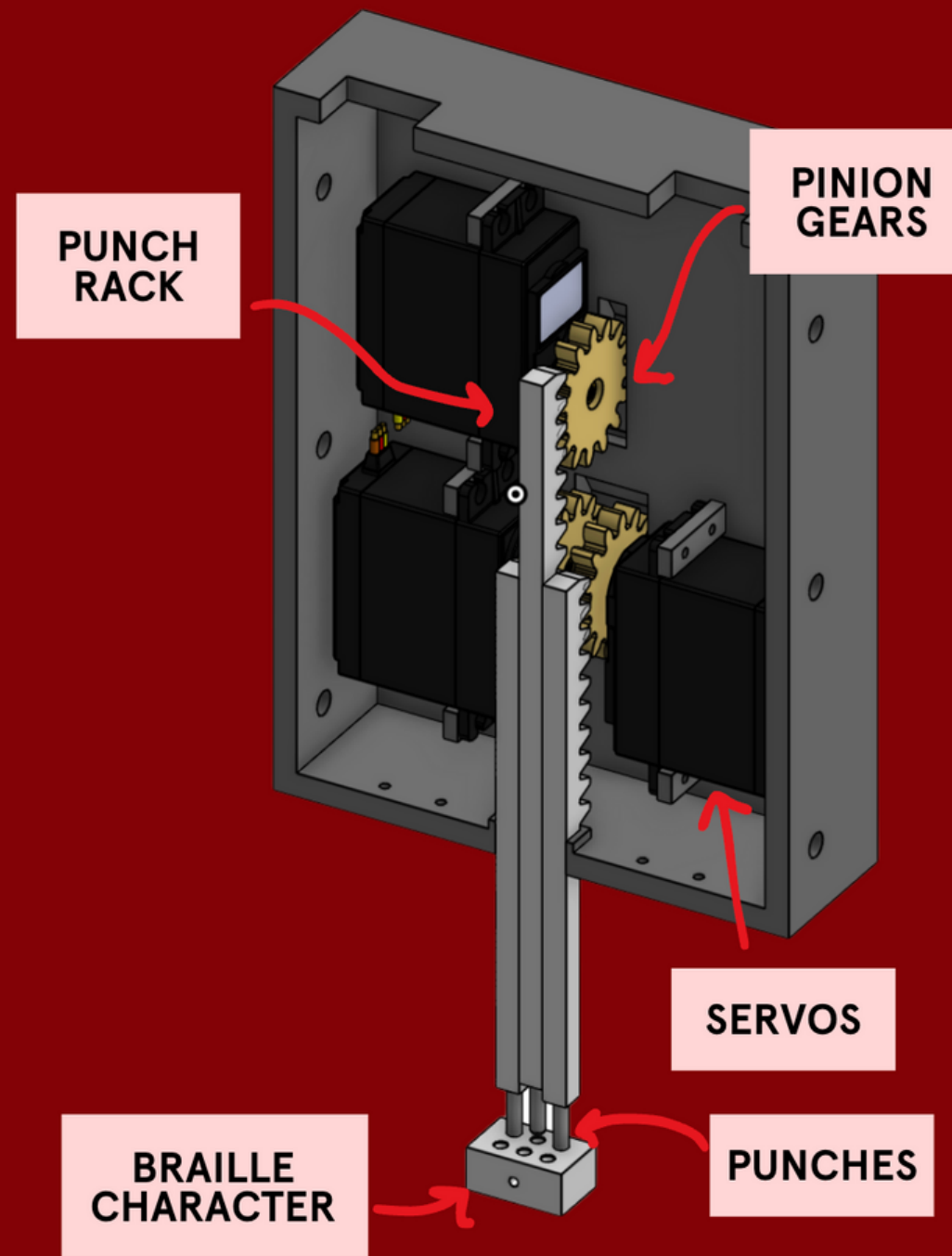


OnShape

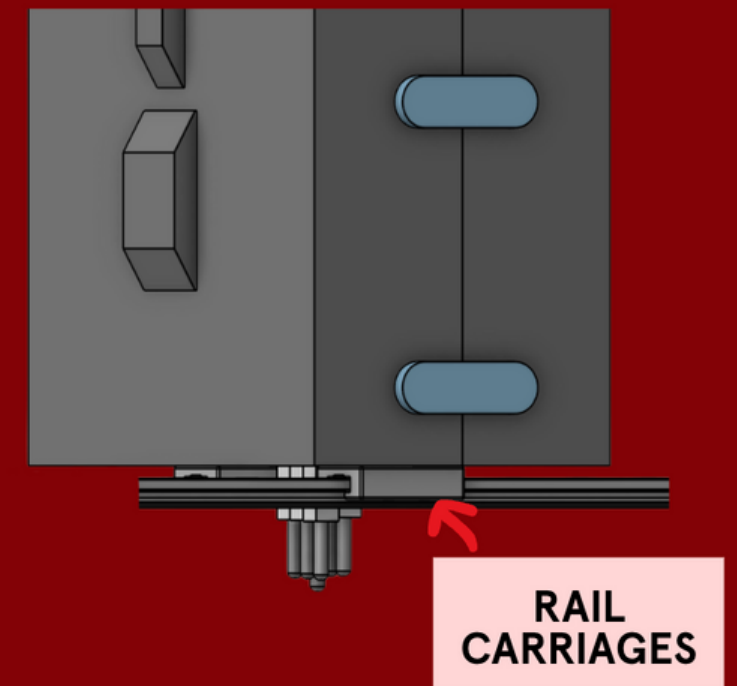
FINAL DESIGN



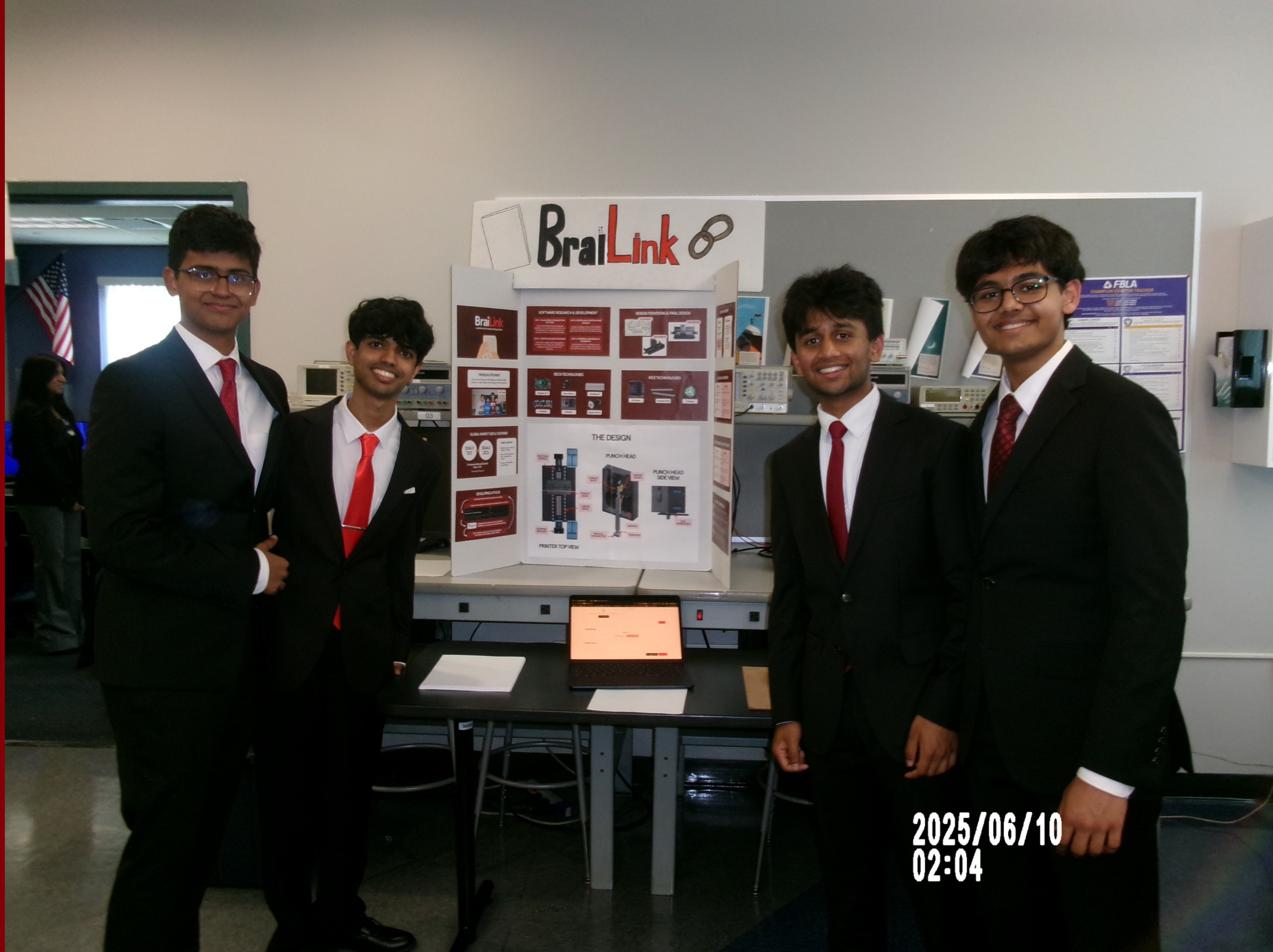
PRINTER TOP VIEW



PUNCH HEAD



PUNCH HEAD
SIDE VIEW



2025/06/10
02:04

ELECTRICAL ENGINEERING & COMPUTER SCIENCE

Challenge

Resolution

Setting appropriate voltage on DRV8825 was extremely difficult



Had faulty motor drivers, purchased new set & worked as intended

External power source for PCA9685



Added 6V power source using 4 1.5V batteries in battery case

Training the optical character recognition model



Used a library with more handwriting images to improve model accuracy

CIVIL & MECHANICAL ENGINEERING

Challenge

Resolution

Ensuring dimensional accuracy with part manufacturing



Added more toleranced parts

Precision errors with belt based punch head movement



Used threaded rods for more precise strength, motion, and force amplification

Motors being used had low torque



Switched to using more easily controllable servos & stepper motors

SOFTWARE RESEARCH & DEVELOPMENT

STEP 1: TRANSLATION & TRANSCRIPTION SOFTWARE

Researched Braille rules and language guidelines, then preformatted the text to fit the Braille printer's paper dimensions by adjusting character count and line breaks.

STEP 2: CONTROLLING SERVOS (PCA9685)

Tested servo angles and timing using the PCA9685 to accurately punch Braille dots, assigning one servo per dot for each character.

STEP 3: CONTROLLING STEPPER MOTORS (DRV8825)

Configured stepper motors with DRV8825 drivers to reset the print head and advance paper after each line with consistent spacing.

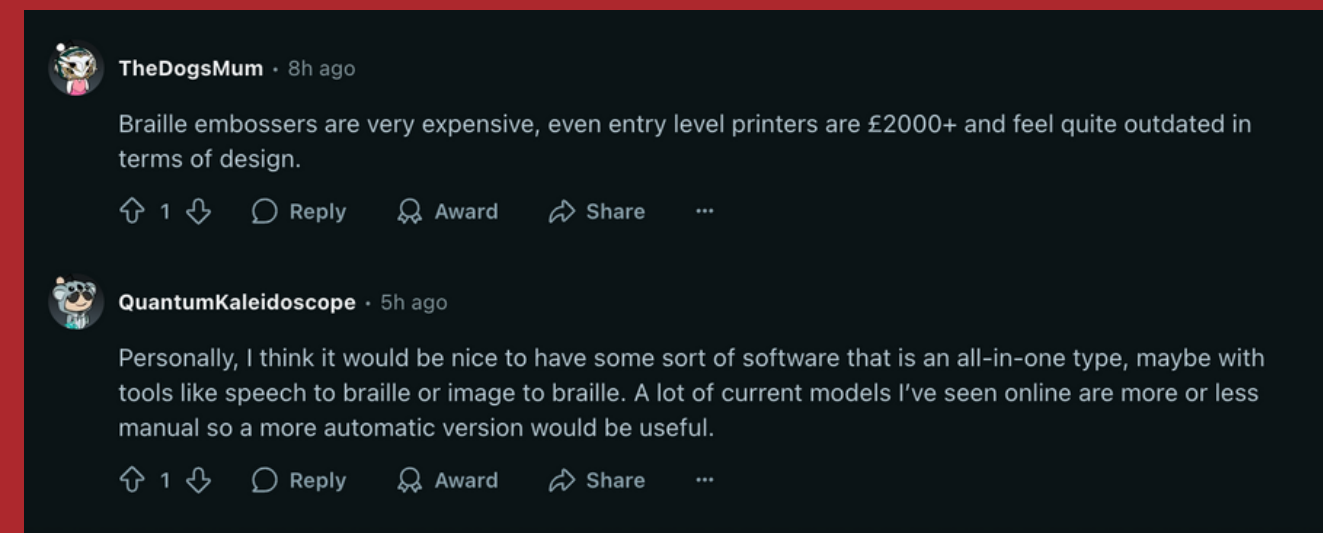
STEP 4: COMBINING COMPONENTS W/ RASPBERRY PI

Used Raspberry Pi to coordinate servos and stepper motors, writing code to sync text input with precise motor movements.

DEVELOPING A FOCUS

Goal: Make braille printing technology more accessible.

To gather more opinions, we surveyed current braille printer users online.



We talked with professionals at the NJ Center for Deafblindness, and attended the NJCDB State Summit.

Narrowed down our focus to 3 key tools: Handwriting transcription, text to braille, and audio to braille.

SCALING FOR COMMERCIAL USE

1

Software: Our software is virtually free to operate, making it more scalable and cost-effective than current market alternatives.

2

Hardware: Due to the repetition of parts between printers, our hardware can be mass reproduced at much lower costs.

3

Hosting Application on Multiple Devices: The printer currently works locally on a device, but support could be expanded through a mobile app for convenience.

4

3D Printed Parts: With industrial equipment and larger 3D printers, instead of developing smaller parts and assembling them together, several large unit can be printed for mass reproduction.