

Braille Typing Device

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Problem Statement

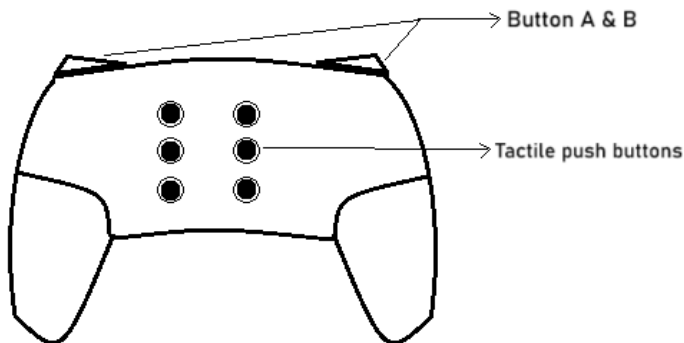
- Visually impaired students encounter difficulties in writing exams without scribe.
- Viability, trustability, and efficiency of scribes also pose a problem.
- This challenge highlights the necessity for innovative writing aids to support their learning journey.



BRaille JOYSTICK

❖ Proposed Solution

- A joystick-based typing device for Braille users with **six buttons** at the back side of joystick representing **Braille dots** for efficient input.
- Additional 2 keys are included for comprehensive writing and navigation, aiming to improve accessibility and usability for visually impaired users.



- This product idea has been developed after **discussing** with **visually impaired students**.
- Based on feedback, we've developed a joystick-based Braille typing device that's both **ergonomic** and **easy to use**.
- The proposed solution also addresses **Sustainable Development Goal – 4** “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”



(Our teammate with students of Govt. Hr. Sec. School for Blind, Thanjavur, Tamil Nadu.)

****All necessary permissions and consent has been acquired.**

TECHNICAL APPROACH

WORKING METHODOLOGY

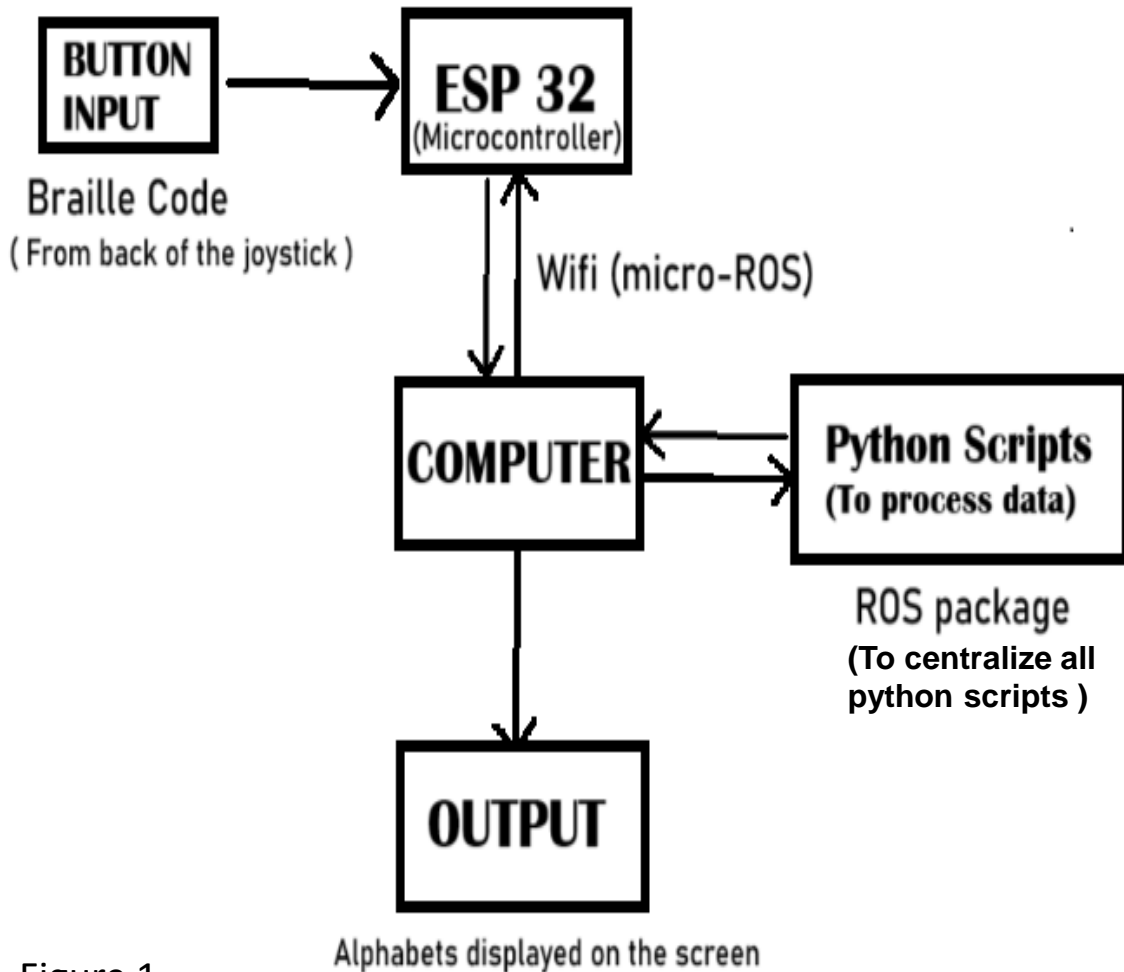


Figure 1

PROTOTYPE 3D DESIGN



Figure 1.1

FEASIBILITY AND VIABILITY

Challenge 1:

-> Correcting spelling mistakes in words.

Solution

-> Use of open – source **spell checker API.**

- LanguageTool
- Aspell

Example:

User Input :

misochondria is tge power hovse of the cell.

Output after using spell checker API:

mitochondria is the power house of the cell.

Challenge 2:

-> Getting Braille combination as input, there is a **chance** of pressing few buttons **quicker** in the combination.

Solution

Back view of Joystick



List operation for Letter "G"

[1] Accidentally pressed button 1 quicker than other buttons for the combination of letter "G"

[1, 2, 3, 4] Remaining buttons are pressed, button codes gets appended to the same list.

[]

- No buttons are pressed now.
- Codes in the list gets converted into corresponding alphabet.
- List becomes empty.

OUTPUT - G

A	B	C	D	E	F	G
⠠	⠠	⠠	⠠	⠠	⠠	⠠
H	I	J	K	L	M	N
⠠	⠠	⠠	⠠	⠠	⠠	⠠
O	P	P	R	S	T	U
⠠	⠠	⠠	⠠	⠠	⠠	⠠
V	W	X	Y	Z		
⠠	⠠	⠠	⠠	⠠		

Code for each button

1	⠠	⠠	2
3	⠠	⠠	4
5	⠠	⠠	6

IMPACT AND BENEFITS

01 INCREASED INDEPENDENCE

Visually impaired students can complete exams and assignments independently without relying on scribes, fostering a sense of self-reliance.



03 EMPOWERMENT AND CONFIDENCE

By eliminating reliance on scribes, students gain confidence in their abilities, empowering them to take charge of their education.



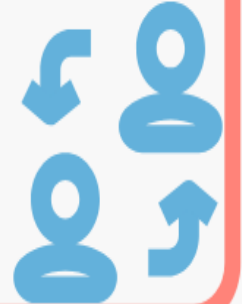
02 COST-EFFECTIVE

Reduces the costs associated with hiring and training scribes, making education more affordable and accessible in the long term.



04 REDUCTION IN SCRIBE DEPENDENCY

Eliminates the challenges related to scheduling and working with scribes, such as scribe unavailability, leading to a smoother academic experience.



Hardware Identified

- ESP32 DEVKIT v1
- Tactile push buttons
- Joystick chassis
- Batteries
- Connecting wires

RESEARCH AND REFERENCES

- Acknowledgement : We thank the Head master, faculty members and students of Govt. Hr. Sec. School for Blind, Thanjavur, Tamil Nadu.
- Kameswari, S. S. D., Harika, D., & Sahu, D. K. (2019). Braille keyboard for blind people. International Journal of Recent Technology and Engineering, 8(1), 156–159.
- V. H. Sîrbu, I. Şerban and I. C. Roşca, "Braille Keyboard for People with Low Vision," 2019 E-Health and Bioengineering Conference (EHB), Iasi, Romania, 2019, pp. 1-4.