<table>
<tr><td>1</td><td>Project Reference Number</td><td colspan="3">46S_BE_1122</td></tr>
<tr><td>2</td><td>Title of the Project</td><td colspan="3">Automatic English to Braille Translator</td></tr>
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<tr><td>5</td><td>Keywords</td><td colspan="3">Optical Character Recognition, Tesseract, Raspbian OS.</td></tr>
<tr><td>6</td><td>Introduction / background</td><td colspan="3">In India, 15 million people suffer from visual loss, with one in five children aged 0-9 being blind. Additionally, 18 million people experience hearing difficulties, while 50,000 individuals have deaf-blindness. Blind people who read in Braille face challenges finding reading materials as they are not readily available in bookstores. To address this issue, a translator has been developed that uses a Raspberry Pi to convert English text into Braille. The microprocessor uses an algorithm for text detection and text recognition to extract the text from the scanned image. This algorithm is designed to identify the text in the image and extract the characters from the image, which controls the motor's movements to produce Braille letters that can be recognized by the visually impaired individual. This technology aims to provide easier access to reading materials for the visually impaired.</td></tr>
<tr><td>7</td><td>Objectives</td><td colspan="3">Implementation of Automatic English to Braille Translator by using Tesseract algorithm for text recognition from scanned images.</td></tr>
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8	**Methodology**	The proposed system utilizes a microprocessor as its central processing unit, which acts as the brain of the system by processing and interpreting input data to generate the desired output. The system uses a raspberry pi camera to capture images of the scanned text document, which is interfaced with the microprocessor via a cable to enable data transfer as shown in fig 1.

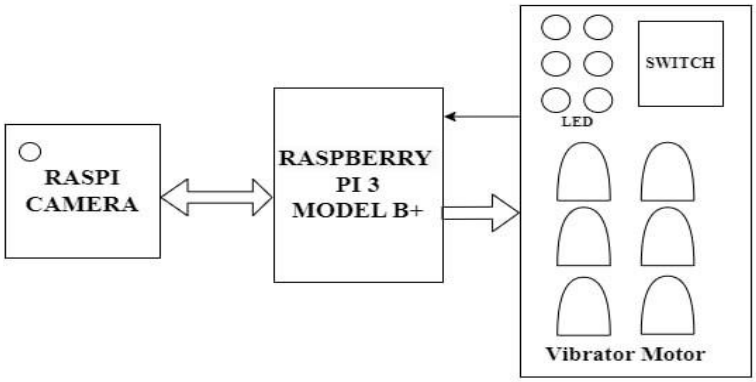


Fig 1: Block Diagram

The system's code is written in Python language, which uses the Raspberry Pi's GPIO pins to turn on and off a set of LEDs that represent the letters of the alphabet.

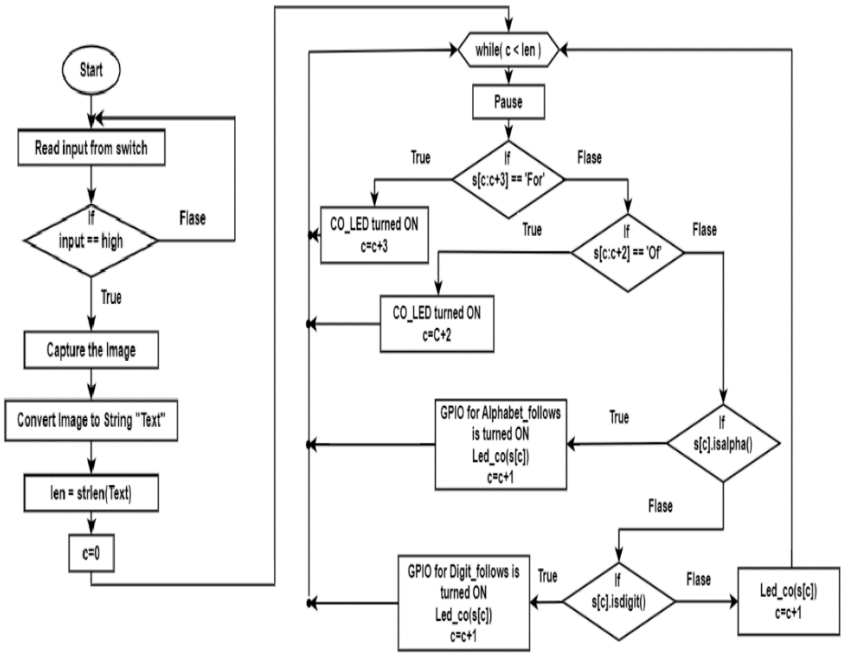
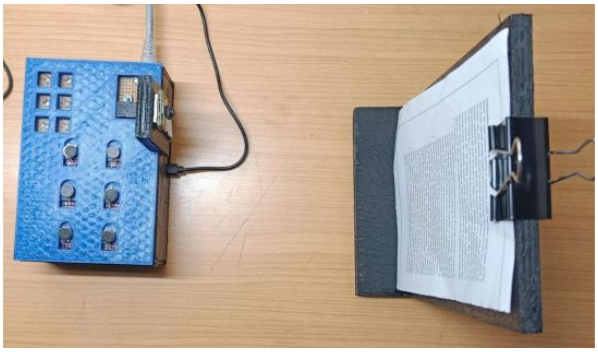
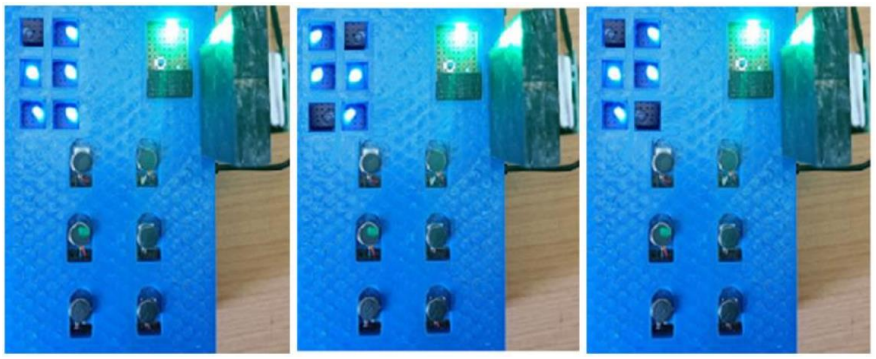


Fig 2: Flow chart

Optical character recognition (OCR) is used to recognize the text on an image that is captured and displays the corresponding sequence

		of LEDs and Vibrator motors. To control the GPIO pins and add a delay between turning the LEDs on and off, the code imports different libraries as shown in fig 2. The output of the system is generated using a vibrator motor, which is connected to the microprocessor's output. Once the text is extracted and converted to braille script, the microprocessor sends the output to the vibrator motor, which then vibrates the braille script, allowing the deaf-blind person to read the text. In summary, the proposed system utilizes a microprocessor, power bank, raspberry pi camera, and vibrator motor to enable deaf-blind individuals to read text. The system's code is written in Python language, which imports libraries such as gpiozero, time, PIL, and Tesseract to control the system's functions.
9	**Results and Conclusions**	The device developed includes a camera and sensors, and its English-to-Braille translation accuracy was generally good, though some errors were identified due to contextual and image quality issues. Overall, the system performed well and demonstrated its ability to accurately translate English text into Braille in real-time, with an average processing time of 0.5 seconds per word and compatibility with different input sources such as keyboard input and file uploads. The model is shown in diagram Fig 3.  Fig 3: Final model English to braille translator implemented works on the principle of grade 2 braille script the code consists of 26 alphabets 0-9 numbers and 10 signs including (+, -, *, @, , /, =, #, _) 10 punctuation including (Full stop, Comma, :, ;, ‘, ?, !, (,), ”, “,) also include 29 word such as ‘And’ ‘For’ ‘Of’ ‘The’ ‘With’ and sounds like ‘Ch’

		‘Gh’ ‘Sh’ ‘Th’ ‘Wh’ ‘Ed’ ‘Er’ ‘Ou’ ‘Ow’. If the text consists of ‘without’ the corresponding led and vibrator motor turned as shown Fig 5.  Fig 4: Output for “WITHOUT”
10	**Scope for future work**	System developed in this project has demonstrated significant potential for improving the lives of deaf-blind individuals worldwide. Future work on the project could focus on enhancing the accuracy and efficiency of the system, as well as exploring the use of additional features like speech output and other control methods like play and pause. The system could also be expanded to recognize various languages and fonts, enabling greater accessibility and independence for individuals with disabilities. Advancements in text recognition and conversion technology could be achieved through this continued work on the project and exploring the use of additional features such as speech output and other control methods like play, pause, rewind, and fast forward. Overall, this project holds great promise for improving the lives of people with disabilities, and further research and development could lead to even more significant advancements in assistive technology.