# Dynamic Reusable Electric Braille Script (DREBS)

## Description:

In India, nearly 40 million people are visually impaired, constituting 20% of the world's visually impaired population. Braille, developed by Louis Braille in 1824, is a crucial tool for their reading and writing. Visually impaired individuals rely on their sense of hearing and touch. Despite the digital age, they face significant challenges, including digital exclusion due to inaccessible websites. Accessibility issues stem from a market-driven approach, neglecting users with disabilities. Visually impaired people struggle to find accessible reading materials, and the internet, a vast resource, remains largely inaccessible. Even screen reading software can't provide a smooth online experience due to poorly designed websites.

## Summary/Abstract:

The project aims to build a dynamic Braille device for visually impaired individuals. It utilizes micro-sized solenoids with pins that respond to signals. Sets of six solenoids represent Braille letters, and these units are used to form text lines. The Raspberry Pi handles text-to-Braille conversion and solenoid control, improving the reading experience for visually challenged users. The step by step approach to this problem statement:

1. **The Controller:** Raspberry Pi, a single-board computer, provides support for electronic devices to create Braille combinations for each letter. A 2x3 matrix of six motors controls the output of Braille letters, moving up or down to represent the necessary pins for each letter. Blank spaces or endline characters are indicated when all the motors move down.

2. **Braille Text:** Braille is a tactile system for the blind, using 2x3 dot cells to represent letters, numbers, and symbols. Letters and numbers have specific dot combinations within the cell. Punctuation and capitalization are indicated through distinct patterns. Grade 2 Braille includes contractions for efficient reading. Blind individuals read Braille by feeling raised dots to recognize characters and words.

3. **Motor Mechanism:** Micro-sized motors are organized in sets of six, with their position indicating 0 or 1. This variable position of the motors is used to represent Braille letters. Sets of motors are employed to display desired letters. However, the number of motor sets is constrained by the available IO pins on a microcontroller.

4. **Multiplexers:** To overcome the IO pin limitation on microcontrollers for driving motor sets, a 74HC595 IC is employed. This IC utilizes just 3 pins from the main microcontroller and offers 8 output pins in a serial order. Additionally, up to 4 of these chips can be daisy-chained, providing a total of 32 output pins while still using only 3 initial pins. This solution effectively expands the available pins for motor control without overwhelming the IO resources.

## Applications:

1. **Enhanced Accessibility:** DREBS significantly improves information access for the visually impaired.

2. **Education:** Facilitates interactive and customized learning through dynamic Braille.

3. **Independence:** Enables real-time information access, promoting greater independence.

4. **Workplace:** Enhances the utilization of modern workplace technologies, potentially increasing participation in various industries.

## Conclusion:

The DREBS project empowers the visually impaired in the digital age, bridging accessibility gaps. It combines Braille with advanced technology to enhance education, foster independence, and increase workplace engagement. DREBS emphasizes inclusivity, ensuring no one is left behind in the digital era. It paves the way for a promising future, where the visually impaired can confidently contribute to society.