A Braille Dicta Teacher

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Abstract: Learning a Braille script is very challenging task for the visually impaired people. In Braille language every character is represented by combination of six dots. Visually impaired people have to remember / memorized the Braille pattern for various letters and numbers. For learning the Braille pattern of each alphabet the visually impaired people need constant guidance. This is raspberry pi powered project which English alphabets in a Braille script are generated using six solenoids. Solenoid is electromechanical device. User speech input is converted into tactile Braille Output. The Braille pattern will generate on Braille pad which is made up of six solenoids. This system enables users to speak out the alphabets/words they want converted into Braille thus learning at their own pace and comfort. For each of input Braille output for each of them is generated synchronously along with the audio output. "A Braille dicta teacher" a system to make learning Braille easier for visually challenge/impaired people.

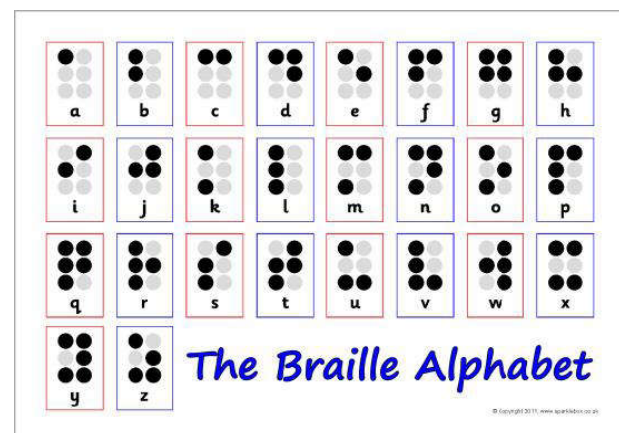Index Terms— microphone, raspberry pi, speaker, solenoid

1. INTRODUCTION

In India due to various reasons, all students are not able to take their basic education. Though we are living in 21st century, the literacy among the blind people is very less.

There are 39 million people across the world that are blind, out of them 15 million are from India. Only 5% of them are able to take the education. Hence to reduce the gap between blind people and their basic education, it is decided to design a Braille dicta teacher which would help the visually impaired individual, to interact with the outside world.

Traditionally stylus and paper along with a Braille slate are used for reading and writing in Braille. This Braille script is derived from the name of Frenchman, Louis Braille who built the system when he was only 16 years old for the blind people. He created the system code as an effort to modify the night writing communication method based on raised dots, which was developed by Capt. Charles Barbier.

There are some papers which confirm the need of automated Braille tutor for learning the Braille script. [1]There are the systems which will convert the text into the Braille script. This is done by using the image processing concept. [3] In India, there are various languages. To read the Al-Quran an electronic device is designed. This device is having both teaching and reading mode. [3]

The Braille Alphabet

2. BACKGROUND

Microcontrollers are gaining popularity day by day, being used in various embedded applications. In essence, a microcontroller is an IC which accepts data as input, processes it, and gives an output signal which can be used to control different devices. There are various types of microcontroller. As per application of

project Raspberry pi 3 b+ controller is suitable for implementation of project.

285 million people worldwide are visually impaired; 39 million of these are blind. Out of which, 15 million people are blind in India. Only 5 % blind people are literate in India. So It is decided to design a system which will help the blind people to learn the basic alphabets by their own.

3. SYSTEM DESCRIPTION

The block diagram of the system has been shown in the figure. This is Raspberry pi powered system in which speech recognition unit, display module, solenoid driver, and solenoid interfaced with raspberry pi controller.
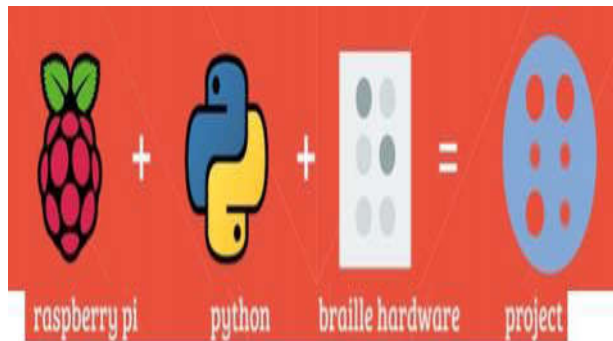

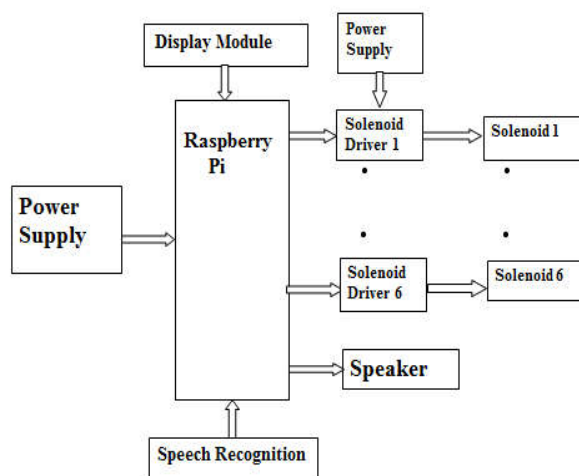
Fig. 1. General Representation of system

Fig. 2. Block Diagram

This system is working in three modes. Auto mode, learning mode and browse mode. The input is given through microphone to the controller. The controller does the speech to Braille conversion and accordingly the pattern will be generated.

3.1 Raspberry pi

The **Raspberry Pi** is a series of small computers. It is having 40 pins. Out of these 40 pins 26 pins are input/output pins. It has four USB ports. It has 512 MB RAM. It also has a slot for placing the micro SD card.
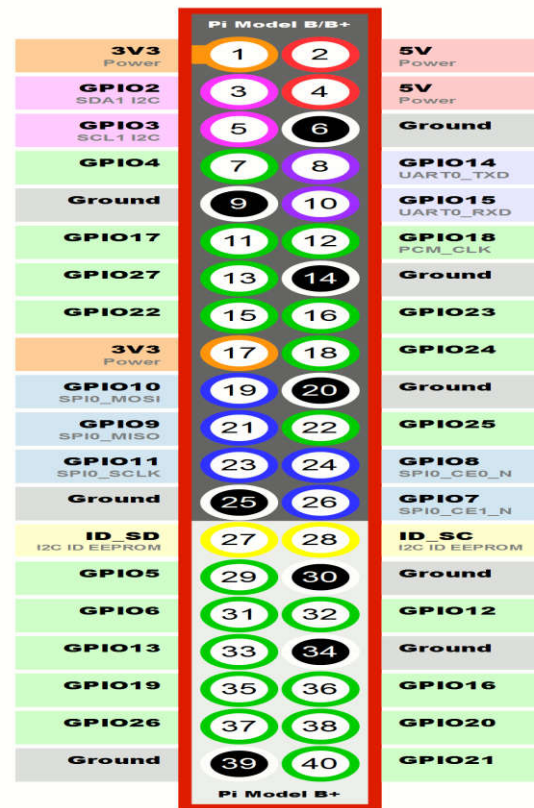

Fig.3. Raspberry Pi GPIO ports

3.2 Solenoid

It is electro mechanical device. It operates on 12V. There are various types of solenoid. In this system linear DC push pull solenoids are used.

3.3 Microphone

Microphone is used for giving speech as an input. Its operating voltage is 2V.

3.4 Relay

A relay is a simple electromechanical switch that is made up of an electromagnet and a set of contacts.

4. METHODOLOGY

In this project speech input will be given through the microphone which is converted into text using Google API code. According to the speech input given, the Braille pattern will be generated on Braille pad. Blind

person will sense the pattern by touching Braille pad and hear the output through the speaker and will learn/understand the Braille pattern.

There are 3 different modes for better learning of Braille script. In first auto mode all the alphabets will be generated, automatically one after another. In second learning mode blind person has to give speech input to the system. So as per speech input braille pattern will generate. In third browse mode user can give an input as short sentence. That sentence will break down into the words and the pattern for each word is generated as a sequence of letters.

5. HARDWARE TESTING

This system is working in 3 different modes:

Auto Mode: The auto mode runs a Fixed sequence i.e. A-Z alphabets and converts it into a braille output which will sense by touching. This is generally suited best for introduction & memorization of alphabets for new blind illiterate student. It reads through all the English alphabets consecutively and Braille output for every of them is generated synchronously at the side of audio output.

Learning Mode: Within the learning mode, user speech input is regenerate into tactile Braille Output. This permits users to speak out the alphabets/words they need to regenerate into Braille therefore learning at their own pace and luxury
.
Browse mode: In this mode the user can give an input as short sentence. That sentence will break down into the words and the pattern for each word is generated as a sequence of letters.

6. CONCLUSION

Electronic Braille Dicta Teacher System enables the Visually Impaired Students to gain a basic learning of Braille script in easy manner and it also makes their life easier to gain the expertise over Braille script. This system enables the Visually Impaired Students to be independent without the need of constant guidance and monitoring from the teacher to recognize and practice the patterns of Braille script.

7. FUTURE SCOPE

It can be further improved by giving multiple language translation features. It can be implemented using IOT technology.

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