

DESIGN OF IMAGE TEXT TO BRAILLE CONVERTER

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ABSTRACT: The visually impaired people form an integral part of our society. There are more than 15 million people in India who are visually impaired. Braille is a tactile traditional writing system used by the visually impaired people on a embossed paper. The image text is converted into Braille code. The Braille output message can be read by just feeling the push-pull action of the solenoids. This Braille system aims to develop cost-effective assistive technologies to provide visually impaired people with a greater degree of independence in their day to day activities and during their navigation.

Keywords : *Arduino UNO, Web camera , Motor drive modules, Solenoids and OCR (Optical Character Recognition)*

INTRODUCTION

Braille is a system of raised dots that can be read with the fingers by people who are visually or who have low vision. Braille is not a language. Rather, it is a code by which many languages—such as English, Spanish, Arabic, Chinese, and dozens of others—may be written and read. Braille is used by thousands of people all over the world in their native languages, and provides a means of literacy for all. Braille symbols are formed within units of space known as braille cells. A full braille cell consists of six raised dots arranged in two parallel rows each having three dots. The dot positions are identified by numbers from one through six. Sixty-four combinations are possible using one or more of these six dots. A single cell can be used to represent an alphabet letter, number, punctuation mark, or even a whole word. New technological enhancements on Braille system are not reachable to the visually impaired people because of their higher cost and less portability. This Image text to Braille converter is low cost, moveable and fast Braille system for the visually impaired people. This Paper aims at replacing the raised dots with solenoids for better usage. The disadvantages of the current system are cost is high, less portable and not user friendly

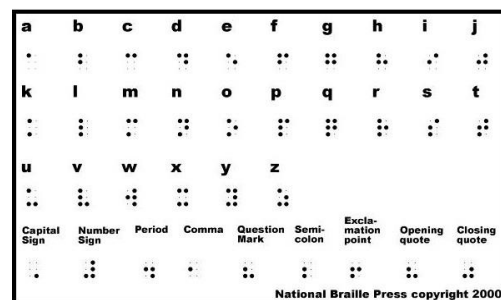
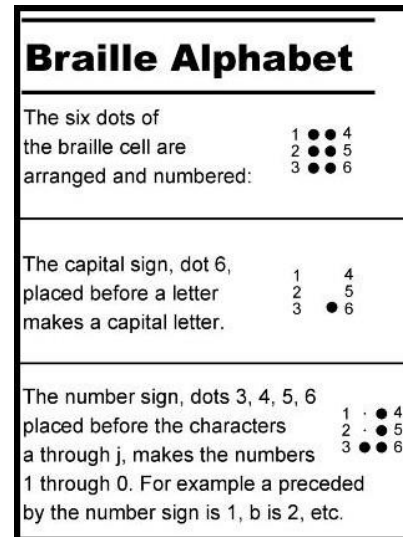


Fig.1 BRAILLE SYSTEM

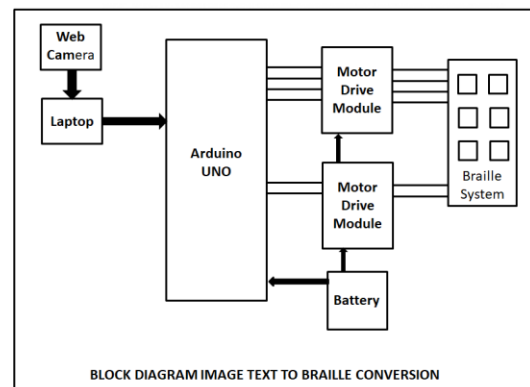


Fig.2 BLOCK DIAGRAM

II. METHODOLOGY

The image consisting of text is captured using a web camera (either by an external web camera or through the laptop). The captured image is then applied to the image pre-processing steps. In the pre-processing steps the undesired noise in the image is removed by applying threshold value. Initially, the captured Image is rescaled to an appropriate size and is convert to gray scale. This gray scale image is converted to binary image. After pre-processing, the text in the image is converted to text file using OCR programming. The flow of conversion is shown in the **Fig.6**. The stored text in text file is fed one by one to the Arduino UNO via the serial communication. Serial communication is a process of sending data one bit at a time; sequentially through USB cable (in Arduino UNO).

Each character is thus recognized by the Arduino UNO. Six solenoids are used to represent the six dots and due to the Push-pull action one can recognize the push action as raised dot. Two motor drive modules L298M are used to drive the six solenoids, 4 solenoids is driven by one motor drive module and the other two solenoids are driven by the second motor drive module. The solenoids and the motor drive module work at voltage ranging from 5 to 12 V DC. A 12V DC battery is used to power the solenoids and the Motor drive modules. All the grounds are connected to a common ground. After recognition each solenoid is triggered for push action. The protruded pin from the original position of the solenoids provides the tactile feedback to the visually challenged people and they can recognize each character.

III. COMPONENTS DESCRIPTION

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable.



Fig. 3 Arduino Uno Board

A microcontroller is a computer present in a single integrated circuit which is dedicated to perform one task and execute one specific application. It contains memory, programmable input/output peripherals as well as a processor.

MOTOR DRIVE MODULE L298N

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A



Fig.4 L298M Motor Drive Module

SOLENOIDS

A coil of wire partially surrounding an iron core, that is made to move inside the coil by the magnetic field set up by a current. It is used to convert electrical to mechanical energy, as in the operation of a switch.



Fig. 5 Push-Pull Solenoid

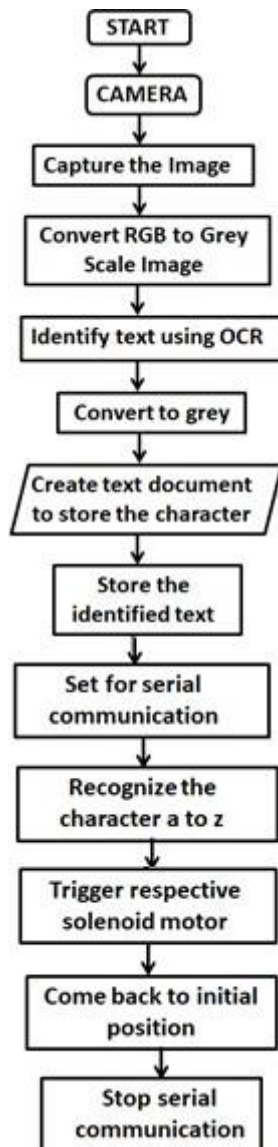


Fig. 6 Flowchart for flow of conversion

VI. RESULT

From this paper presentation we have obtained the following outcomes. When an Input Text image is given as D, the output that is obtained is shown in Fig.7 and Fig.8.



Fig 7.Solenoid projection for a given input text D

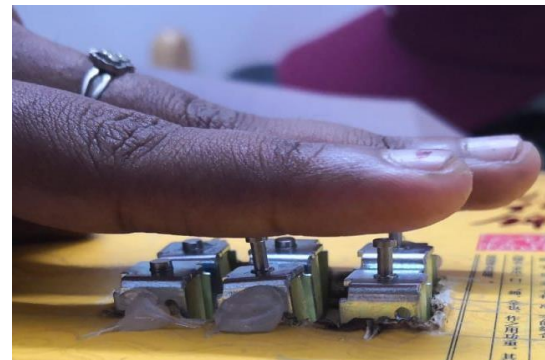


Fig.8 The solenoid projection being felt by touch

VII. CONCLUSION

This Braille system aims to develop cost-effective assistive technologies to provide visually impaired people with a greater degree of independence in their day to day activities and during their navigation.

VIII. FUTURE SCOPE

This can be expanded to an image text to audio output so that the visually impaired people can hear the text message through a speaker. This can be further expanded to reading images like sign boards, directional arrows and numerals by suitably pre-defining in the software.

VIII. REFERENCES

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