IMPLEMENTATION OF KANNADA TO BRAILLE TRANSLATOR

Project Reference No.: *45S_BE_0953*

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Keywords:

OCR, Pytesseract, Braille Device, Raspberry Pi, Solenoids

Introduction:

Approximately 12 million blind people live in India, making it a third of blind population around the world. Karnataka has about 2, 50,000 visually impaired individuals according to the 2011 census. Braille enables everyone to benefit from Academic freedom, security impartial opportunity to study and work. Braille is the language of the blind that consists of patterns of raised dots that can be felt with the fingertips. During the dark hours of the war, the French military used Braille as a device to transmit potential data. In 1829, Louis Braille, who was himself visually impaired, modified and customized this specifically for blind people. Frank H invented the first Braille writing machine in 1892. Over time, technology advanced, and electronic Braille keypads were developed. We live in an information-oriented society and everyone should have the access to obtain this information. Specially, portable electronic devices such as mobiles, computers and PDAs are the representation products that are used to deliver variety of information. However, it is very difficult for the visually impaired people to use those devices. It is very important for everyone to have intellectual freedom, personal security, independence and have equal opportunities to study and work and braille enables that.

The author Adrian Moise, presented the development of an automatic system used to convert computer written text to the Braille language using a microcontroller connected to a special device that can be read by blind persons. Piezoelectric linear motors have been used in the braille device as stated by author Hyun Cheol Cho and braille converter devise has been devised by the author Joshua L which was developed for visually impaired individuals to assist them in reading printed materials on English. In our proposed device we use solenoid motors which are efficient and cost effective in the braille device and raspberry Pi is used for the control. Extensive work has been done on the translation of English to braille and minimal research on translation of regional languages to braille especially Kannada. In our proposed device we work towards this cause.

Objectives:

The objectives of the project are:

1. To design a system to translate Kannada to Braille using OCR.
2. To design a cost-effective system for visually impaired people.
3. To develop a user-friendly and reliable system with good accuracy.

Methodology:

In the project proposed, pytesseract tool of OCR is used and code is written in python language. First, image is captured using the camera as shown fig. 3. And that captured image was processed using OCR and the output of OCR was displayed as shown in fig. 4.

The process of OCR is shown in fig. 2, and explained below.

- The first step in any image processing system is to process the input image through Image Acquisition. A real-world optical image is transformed into a numerical array. Next, image enhancements are performed in order to highlight certain aspects of an image or to weaken or remove any unnecessary information.
- Following this, image processing filters are used to either smooth or enhance the image by suppressing the high frequencies in the picture or by enhancing or detecting the low frequencies in the picture.
- The character segmentation method seeks to break an image consisting characters is broken into individual character and sub images are formed. An optical character recognition system uses it as one of its decision processes.
- Using the GUI interface on the PC, the character is recognized and displayed.

Then mapping of each Kannada character to Braille is done as shown in fig. 3, depending upon the input given. ASCII values are converted to the recognized words. As the ASCII values are converted to appropriate binary values, the recognized words are mapped to braille characters using ASCII to braille algorithms. After mapping of the characters, it is sent through raspberry pi. The serial peripheral input of the raspberry pi sends a clock pulse input of a binary value to the relay. The mapped characters in Braille are sent to solenoid. As a switch, the relay turns the solenoid on and off based on input. Solenoids are integrated into the braille keypad. It pops up whenever the binary value is 1.

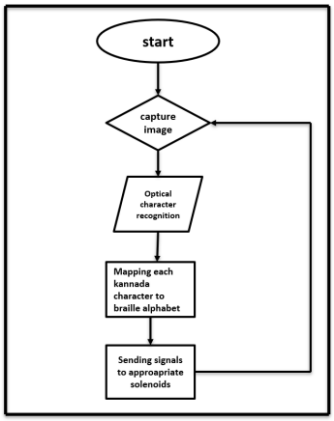

Fig 1. Flow Diagram

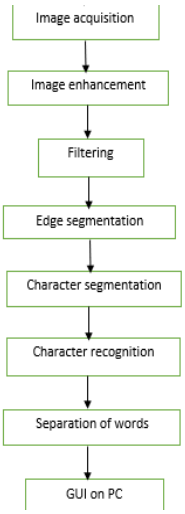

Fig 2. Flow Diagram of OCR

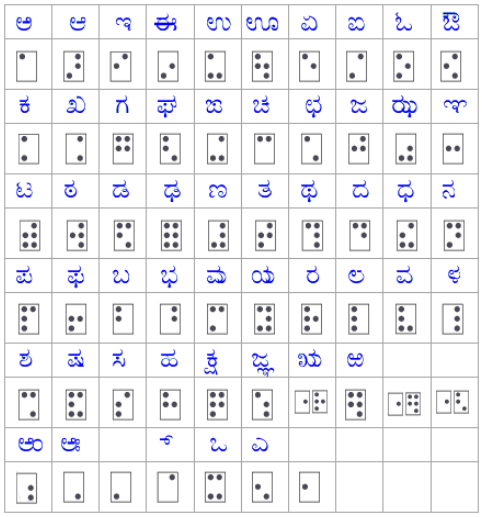

Fig 3. Braille characters for Kannada language

Conclusion:

The results are categorized as follows:

- The first step is that a Kannada text was captured with the help of camera as shown in fig. 4.
- And that captured image is processed using OCR and the output of the OCR is as shown in fig. 5.
- The output of OCR is passed on to the Braille device through raspberry pi. According to the text, the Braille keys attached to the solenoid motors will move up or down depending upon the characters scanned by the camera so that visually impaired people can sense that which is shown in fig. 6, in hardware implementation.
- For example, only three letters that can be scanned is shown in fig. 4.
- The first three letters 'ಮಗನ' has been read and displayed first and the letters 'ನಗರ' has been obtained in fig. 6 with red, blue and pink respectively in the text 'ಮಗನ ನಗರ'.

The proposed device helps visually impaired people to be more independent and flourish in today's rapidly developing world. Having access to communication in its broadest sense is having access to knowledge, and knowledge is vital for being treated equally and achieving maximum personal autonomy. Some Kannada ottaksharas are difficult to map. With further work on the proposed device this can be improved. In this project, mapping of varnamale is done.

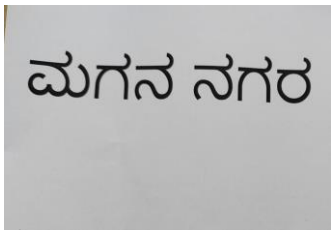

Fig 4. Captured Image

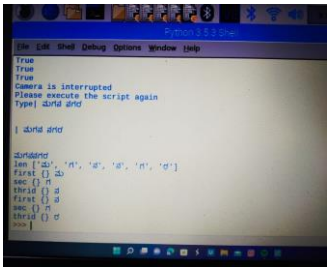

Fig 5. Output of OCR

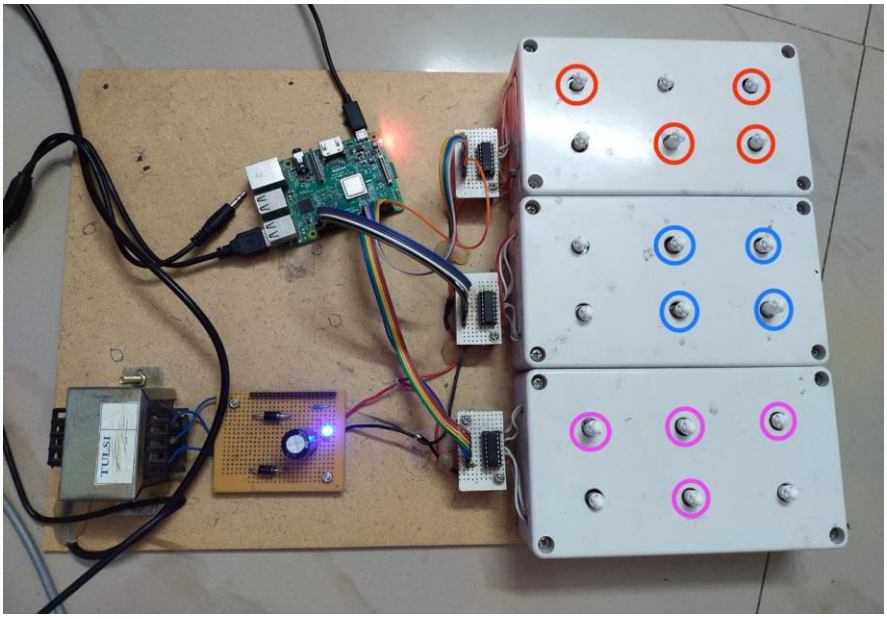

Fig 6. Hardware implementation

Scope for future work:

Kannada language has difficulty in mapping ottaksharas and kaagunitha. It is possible to reach the goal with further advancement in work.