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Voiced Controlled Braille Embosser

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Abstract: *This abstract presents an innovative method to create a Braille Embosser, which would be controlled by voice. The required embossed character will be provided by printer after giving the voice command. The technique would be most helpful for visually impaired people to perform their typing task. Creating a speech controlled printer using various electrical and mechanical domains such as digital signal processing, analog circuit design, and interfacing the electrical bobbins is the main objective of this project.*

Graphic printing is becoming more and more important in the life of blind people. Until now, unfortunately, braille printer can't print graphic. Thus, in this project, a graphic printing method for embosser has been introduced which utilizes voice recognition and edge detection to convert English alphabets to corresponding actual Braille language. Then, it utilizes faster scan method to read the input voice and print the graphic with dot style. This can achieve graphic printing with different sizes of image onto A4 paper clearly and completely. This voice controlled braille embosser can be used for identifying the graphic printing as well.

Keywords: *Arduino micro controller, electrical bobbins, speech processing, stepper motor.*

I. INTRODUCTION

Presently in India, the population of people with visual impairments stands at fifteen million(15 million). People with visual impairment and people with both visual and hearing impairments face difficulty in communication and pursuing their goals. They communicate through Braille – a tactile writing system. It is written with embossed paper. Braille characters are rectangular blocks called cells that contain raised embossed dots. The number of dots and their arrangement inside the cell distinguish one character from another. Braille Material needs to be printed in printers called Braille Embossers. These printers are direct impact printers which render text as tactile braille cell.

The cost of such printers are very expensive, and the average individual consumer cannot afford such a printer. There is not any viable method for short-hand notes for students with these impairments. In this paper we propose to record the voice of a speaker using microphones and print the translation of the speech in braille. We use Microsoft Bing Speech API to convert Speech to Text. We then implement Text to Braille Translation using Liblouis Open Source Translation. We print the converted Braille onto paper using a Modified Dot Matrix Printer to emulate Braille embossers. We use the following modules to implement our idea.

Arduino NANO. Speech To Text Module Text To Braille Module. Modified Dot Matrix Printer Module. This system uses microphones to capture voice input. The Speech to Text and Text to Braille conversion is done in the Arduino NANO through Software Implementation and finally Braille Embossing is done through modified Printer. This project helps people with visual impairments to affordably print Braille notes and encourages them to pursue academic goals, without considering their impairment as a hindrance.

II. LITERATURE SURVEY

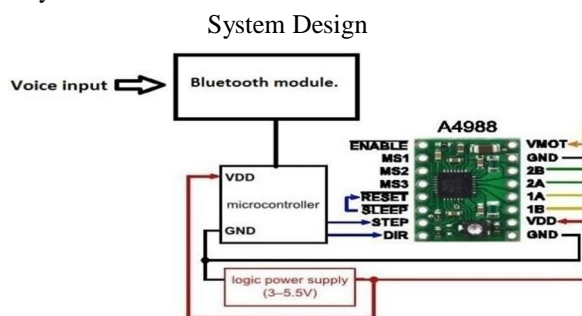
Braille is a language which is used by the visually impaired. The paper which is used for printing Braille letters is known as Braille paper. Braille-users can read words by touching the Braille printed on paper. Braille got its name from its inventor Louis Braille who lost his vision due to an accident which he met when he was barely 15. Thus to overcome his difficulties he started working on the code to develop the language which can be understood by the visually impaired. His first paper was published in 1829. Braille language consists of dots arranged in columnar fashion known as cells. They are nothing but elevation on the other side of the paper. A full Braille letter consists of six cells having two columns and three rows. The cells are denoted by simple numbers such as one, two, and three and so on. Total of sixty four combinations are possible.

B Dange and A Brahmane [1] found Braille Printer to be of a very great help for visually challenged people. They are different type of printers which are used to print Braille. They make use of Braille embossed paper for this purpose. They are noisy and very costly. As these printers are costly hence developing them in India is difficult as the ones developing them are finding issues when it comes to funds. Project DRISHTI is a solution which helps the visually challenged person to use simple facilities offered by a computer.

Padmavati S and Nivedta V [2] focus on the process of printing Braille documents using a dot matrix printer. Without Braille language there is no other source of communication for the visually impaired. Therefore this project was developed to help such people. The documents were printed in Braille using a dot matrix printer keeping into consideration all the standard sizes and accuracy of the mark made on paper. Trial and error method was used to choose the best possible outcome.

Using Paul Blenkhorn [3] paper we get a detailed description of a method for converting Braille, as it is stored as “characters” in a computer, into print. The system has been designed in such a way that we can get a wide range of languages and character sets. It makes use of a table driven method to achieve the required result.

Braille printer is basically used by the visually impaired. However the current Braille printers available in market are only used for commercial purposes such as printing books based on Braille language. Also Braille printers which are available in market are complex and complicated to operate as they are not designed to be used by common man as per his own personal preference, this makes it difficult for the a person with visual impairities to use the printer. Disadvantages of existing system: Present system cannot be used for personal use. Present system is more complex to operate. Custom texts are not possible using the current system . Current system is costly



A4988-It is a driver circuit for the servo motor which will make the servo motor move.

- 1) *Arduino Nano*: This 36 pin microcontroller will be used to process the voice input & will be connected to the bluetooth module & the A4988 driver circuit.
- 2) *Power Supply*: Two power supplies will be used in this project from which one will be a logic power supply of 3-5.5V & it will be used for powering the arduino microcontroller, & the second power supply will be of 8-35V & it will be used to power the servo motors connected to the embossing assembly.
- 3) *Bluetooth Module*: 6 pin HC-05 bluetooth module which will be connected to the arduino nano on the Tx & Rx pins & a 5V power supply will be connected to the Vcc pin.

III. CONCLUSION

As we know that Braille Embossers present in market use keyboard in order to emboss the Braille writing. So we are coming up with an embosser with voice recognition input. It is basically an addition of voice to text feature. Our research is focused mainly on developing a system that reduces the difficulty in reading a document & introducing a cognitive system. We have found some solution for weakness in the existing system with added new ideas. This project is also cost effective compared to Braille embossers present in the market.

IV. FUTURE SCOPE

This project has been developed mainly to reduce the cost of Braille printing and also to make the braille printer affordable and available to the individuals. This projects outputs is same as that of the existing high cost braille printers and also helps the visually impaired people to recognize the Braille output easily. It involves easy modification from the already available dot-matrix printer. Speech recognition functionality is an added bonus to this paper. This functionality helps the visually impaired people to print braille for their personal use, without using a computer or a mediator, by speaking the sentences to be printed with the help of microphone. The sentences they speak are then translated to braille by the processor and thus printed. Multiple copies can also be printed by a simple button press operation of the Print Button. Improvements can be made such that feedback vibration be provided for the visually impaired to know which button they have just pressed. The microphone module is highly sensitive to distance from speaker. By using industry-class MEMS microphone, this disadvantage in the product can be overcome. Further development in this product can see a whole new dimension opened for people with visual impairments to compete and grow with the rest of the society. It can also be used in google lens and neurology.



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