

Braille Printer

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Abstract: The objective of the paper is to describe the process of printing Braille documents using a dot matrix printer. Braille Printer proves to be of a very great help for visually impaired people. They are specialized printer that is used for printing in Braille Format. Different from a normal printer they use a special type of paper for the purpose. They are noisy and expensive.

Keyword: Braille, Braille code, Braille script, Mirror image.

I. INTRODUCTION

Blind people have various challenges to deal with. Since they cannot see the world with their eyes they face problems in doing communication with normal people. Here we propose a System for blind people which will help them to communicate. Our project "Braille printer" is a system which will print the alphabets and numbers in Braille format. Braille makes use of six dots which are split into 2 columns of three dots each. The ones which are on the left hand side are numbered as one-three and the ones which are on the right hand side numbered as four-six. The distance between two consecutive dots is approximately 0.1 inches (2.5mm) and the height of the any given dot is approximately 0.02 inches (0.5mm) high. The distance between the left hand side dot and right hand side dot is approximately 0.15 inches (0.15 inches). The paper which we will be using for printing the Braille letters is a strip which is thicker than our usual paper. Trained professionals with sight problem have the ability to read approximately 100 words per minute; and the ones which are visually impaired can read around 250 to 300 words per minute.

II. RELEVANT THEORY

- The Braille Script

Braille language is the one which enables the visually impaired to read and write by using the sense of touch. It was introduced to the world by Louis Braille. He was French and a teacher of the blind. There are cells which consist of six dots arranged in a 3x2 fashion. Each cell resembles an alphabet, number or punctuation.

- Braille Codes

Braille scripting requires the text to be printed on a thick sheet of paper using special symbols representing the letters of the alphabets. Each symbol consists of two columns having three rows in each of it. The rectangular array is referred to as a cell and in each cell one or more dots will be printed in such a way that the dot is having slight projection. A visually impaired has to learn how to feel the projections by his fingers, hence recognizing the letter. The different arrangement of these dots can go up to sixty three different combinations. The dots are numbered as one, two and three and so on for convenience.

- Supports for Braille

Visually impaired people make use of Braille Stylus and Slate.

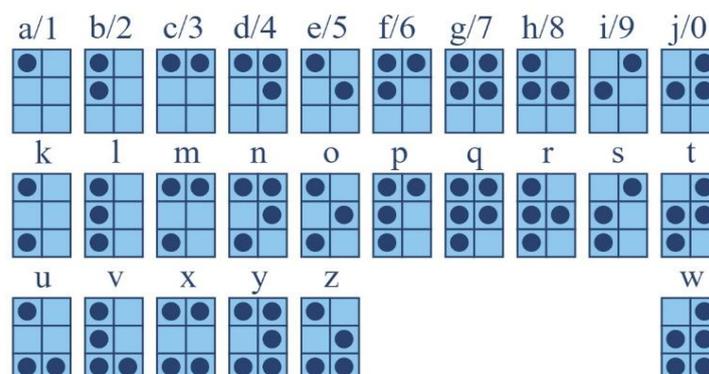


Fig. 1. Alphabets & Numerals in Braille



They place the Braille paper in the slate and then using stylus they pierce the paper thereby creating projections. These projections help them to read the letters easily. As the projections are on the other side of the paper thus the paper has to be flipped in order to understand the letters.

III. REVIEW OF LITERATURE\

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.

When Braille language was first introduced to other languages there was immense confusion as that time there was no alphabet W in French. So the English alphabet W was assigned to X and X was assigned to Y and so on. In Canada the notes have raised dots which help the visually impaired to distinguish between different currency. The Braille which is used on these notes is different than the actual Braille and is implemented with mutual consent of the visually impaired Canadians. In India the parliament acts are published in Braille. In United Kingdom it is necessary for the medicine manufactures to have the medicine name in Braille.

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.

IV. EXISTING SYSTEM

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 impairments 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.

V. REQUIREMENT ANALYSIS

The requirement for the proposed project consists of some hardware and software elements.

Software Requirements:

- Programming language used is embedded C for coding.
- The Arduino software (IDE) makes it easier to write code and uploading it on the board. This software can be used with any Arduino board.
- Windows 7 or LINUX can be used as operating system.

Hardware Requirements:

- 3 Stepper motors



- Servo motor
- 16x2 LCD display
- PS/2 Keyboard
- ATmega 328
- 5V Power supply

VI. SYSTEM DESIGN

- Proposed system

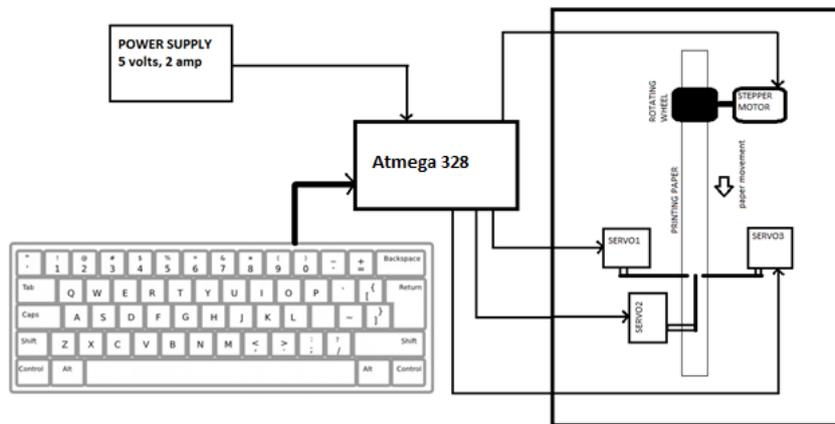


Fig. 2. Proposed System

Here when we give the input for any English alphabet the ATmega checks for the corresponding Braille letter and gives command to the servo motors to print accordingly

Only one servo motor works at a time it pierces the page and then the stepper motor comes into action. The Stepper motor moves the paper one step ahead and then the second servo motor pierces the paper as per the written code and in similar fashion the third servo motor does the work, as a result of which we get our required letter in Braille language.

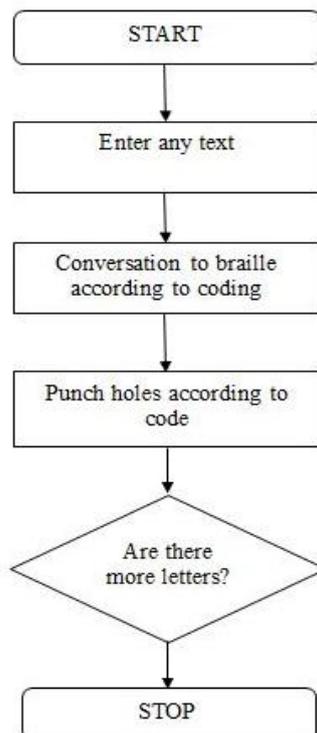


Fig. 3. Functional Diagram



- System architecture

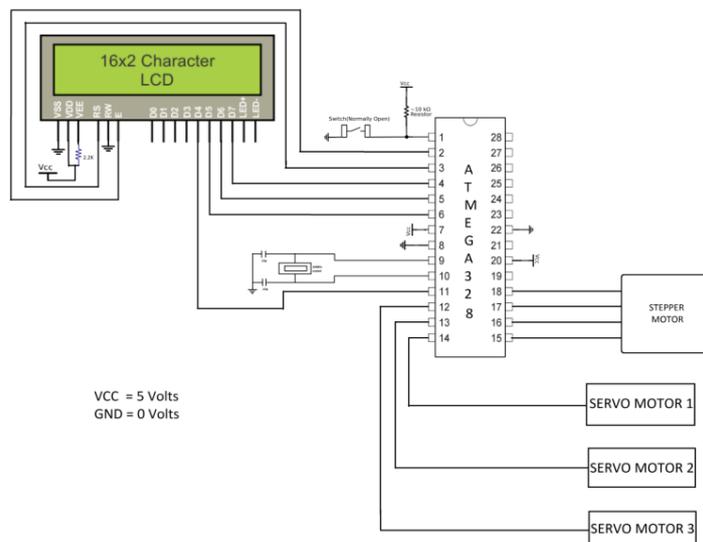


Fig. 4. Architecture of System

VII. RESULT

The expected result from the printer is as shown below.

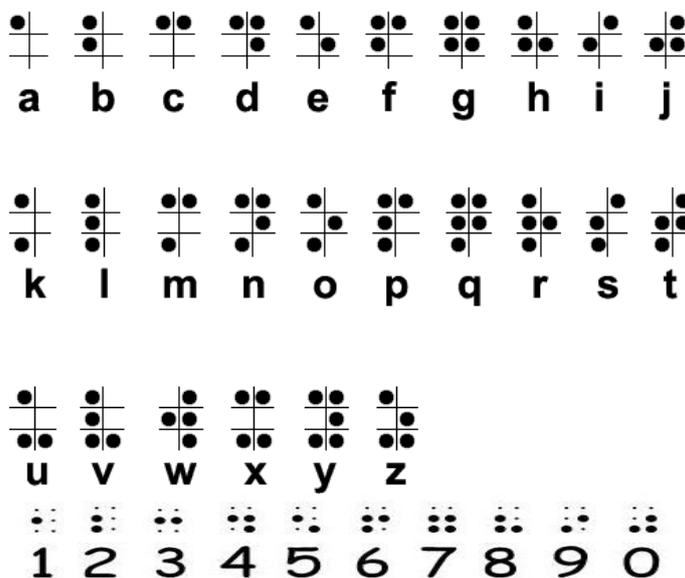


Fig. 5. Alphabets & Numbers in Braille

These Braille letters are read by the projection on the other side of the paper. The printing is done in such a way that the side which is to be read is the one which consists of projections. After a series of experiments we found that printing mirror image of the output on the back side of the paper results in printed braille on the front side suiting the reader to feel the dots. The mirror image of the output is obtained using CAD, which is then sent to the printer for printing process. The pins hit the paper to make projections on the opposite side, mirror image is fed to the printer and the printer prints the projections on the paper.



Fig. 6. Braille for Hello World



Fig. 7. Mirror Image of the Braille

VIII. CONCLUSION

The Braille printers which are available in market are used for commercial purposes, as compared to those, the one which we have developed is much cheaper.

Proposed system describes course and results of work on development of new hardware aiding blind people and use new technologies in well-known hardware. Proposed system is useful for blind and visually impaired persons. This printer allows visually impaired to enter the English alphabet as input and then the corresponding Braille letter is printed on the Braille Paper. These printouts are very important in intellectual progress of blind and weak sighted people. These printouts are very important in education, developing their perception.

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