

# Malayalam Braille Typewriter

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**ABSTRACT:** Writing is a very effective means of communicating our thoughts to people. We use scripts provided by the language to convey our thoughts through paper. Braille is a system that enables blind and visually impaired people to read and write through touch. This paper tries to implement a new system where the blind people can read as well as practice writing in Braille language. The important point is that here we use Braille in Malayalam language. The printed paper provides Malayalam letters punched as Braille characters. This is a cost effective and compact system which will serve an important role in this modern era. The letters to be punched are pressed in the keypad and correspondingly the six solenoids get excited and it is punched on a paper. The system consists of a hardware session which mainly consists of a PIC microcontroller, keyboard for giving inputs, a printing module to hold the paper to be printed, DC motors and its drivers for controlling the vertical and horizontal motion of the paper and a solenoid box with six solenoids arranged as a 3\*2 matrix for making imprints on the paper

**KEYWORDS:** Braille, Tactile writing system, Perkins Brailier.

## I. INTRODUCTION

Braille was based on a tactile military code called night writing, developed by Charles Barbier in response to Napoleon's demand for a means for soldiers to communicate silently at night and without light. In Barbier's system, sets of 12 embossed dots encoded 36 different sounds. It proved to be too difficult for soldiers to recognize by touch, and was rejected by the military. In 1829 Barbier visited the royal institute for the blind in Paris, where he met Louis Braille. Braille identified two major defects of the code: first, by representing only sounds, the code was unable to render the orthography of the words; second, the human finger could not encompass the whole 12-dots symbol without moving, and so could not move rapidly from one symbol to another. Braille solution was to use 6-dots cells and to assign a specific pattern to each letter of the alphabet. At first, Braille was one-to-one transliteration of French orthography, but soon various abbreviations, contractions, and even logograms were developed, creating a system much more like shorthand. The expanded English system, called grade-2 Braille, was complete by 1905. For the blind today, Braille is an independent writing system rather than a code of printed orthography [1].

People who don't have the sense of vision uses a different type of script known as Braille, named after its founder, Louis Braille. Braille script is a universally accepted script which is used by blind people. It is unlike the scripts that the normal people use for writing. Braille uses the sense of touch. This script enables the blind people to communicate each other's through reading and writing. Each alphabet has a hot unique Braille code. It uses a sense of touch. It consists of six dots arranged in the form of a 3\*2 matrix. Corresponding to each alphabet certain dots will be printed on the paper. Malayalam script contains hundreds of characters, including conjuncts. It is widely accepted that as the number of characters become large, it becomes unwieldy and inefficient for typing and printing. After detailed study, discussions and deliberations, characters of Malayalam script were modified in 1968 to make it easier to handle in typewriters. Along with that, Malayalam typewriter keyboard layout was also standardized. The manufacturers of the typewriter keyboards added their own modifications to this standard. The typewriter keyboard layout was designed for mechanical Typewriters and the criteria are slightly different for computer keyboards [2, 3].

## II. LITERATURE SURVEY

Braille script is a universally accepted writing system for the blind people. It is traditionally written with embossed paper. Braille is named after its creator, Frenchman Louis Braille, who went blind following a childhood accident. In 1824, at the age of 15, Braille developed his code for the French alphabet as an improvement on night writing. He published his system, which subsequently included musical notation, in 1829. The second revision, published in 1837, was the first digital (binary) form of writing. Braille characters are small rectangular blocks called cells that contain in palpable bumps called raised dots. The number and arrangement of these dots distinguish one character from another [1].

Invented by Louis Braille in the 1820s, braille is a tactile writing system of raised dots. It was a breakthrough for people who are blind, because, unlike earlier embossed-letter reading systems, braille can be used to both read and write. It is read very quickly with the fingers, but writing braille manually with a slate and stylus, the device used by Louis Braille, was rather slow.[4] In the first decades of the 20th century, Perkins School for the Blind designed and manufactured several models of Braille writers. They were similar to the Hall model in that they had typewriter-style keyboards and moving carriages. However, these Braille writers had some drawbacks. Because the machines were individually made, the tolerances were not very accurate. They required frequent repair, the cast-iron frames broke easily when dropped, and they were noisy and expensive. Most Braille writers available at the time had similar problems, and nothing about the Perkins models made them superior to any of the others. In 1931, Perkins School for the Blind welcomed Dr. Gabriel Farrell as its new director. Dissatisfied with the indifferent quality of the Perkins machines, Dr. Farrell ordered the Howe Press to cease production of its Braille writers. However, he remained determined that Perkins would someday design and produce an excellent machine. In the absence of a skilled person to design it, this remained an unreachable goal for several years [5].

അ	ആ	ഇ	ഈ	ഉ	ഊ	എ	ഈ	ഊ	ഈ
ക	ഖ	ഗ	ഘ	ങ	ച	ഛ	ജ	ട	ഠ
ട	ഠ	ഡ	ഢ	ണ	ത	ഥ	ദ	ധ	ന
പ	ഫ	ബ	ഭ	മ	യ	ര	ല	വ	ള
ശ	ഷ	സ	ഹ	ക്ഷ	ഋ	ഌ	഍	ഐ	ഓ
അം	അഃ	ഃ	ഌ	഍	ഐ	ഓ	ഔ	ഓ	ഔ



Fig.1: Braille letters corresponding to Malayalam characters

Fig.2: Perkins Brailier

## III. PROPOSED METHODOLOGY

The proposed system consists of a hardware session which mainly consists of a PIC microcontroller, keyboard for giving inputs, a printing module to hold the paper to be printed, DC motors and its drivers for controlling the vertical and horizontal motion of the paper and a solenoid box with six solenoids arranged as a 3\*2 matrix for making imprints on the paper. The letters to be punched are pressed in the keypad and correspondingly the six solenoids get excited. Apart from this the system needs a 5V supply for PIC and 12V supply for motors and solenoids.

The block diagram mainly consists of a keypad, microcontroller and a printing module. The keypad used is a 4\*4 matrix keypad. It consists of 16 letters. Two similar keypads are used and two letters are assigned to every single key. Thus a total of 64 letters can be realized. The microcontroller used is PIC16F877A.

The system can be divided in to 4 parts.

**Controller section:** The controller used is PIC16F877A.

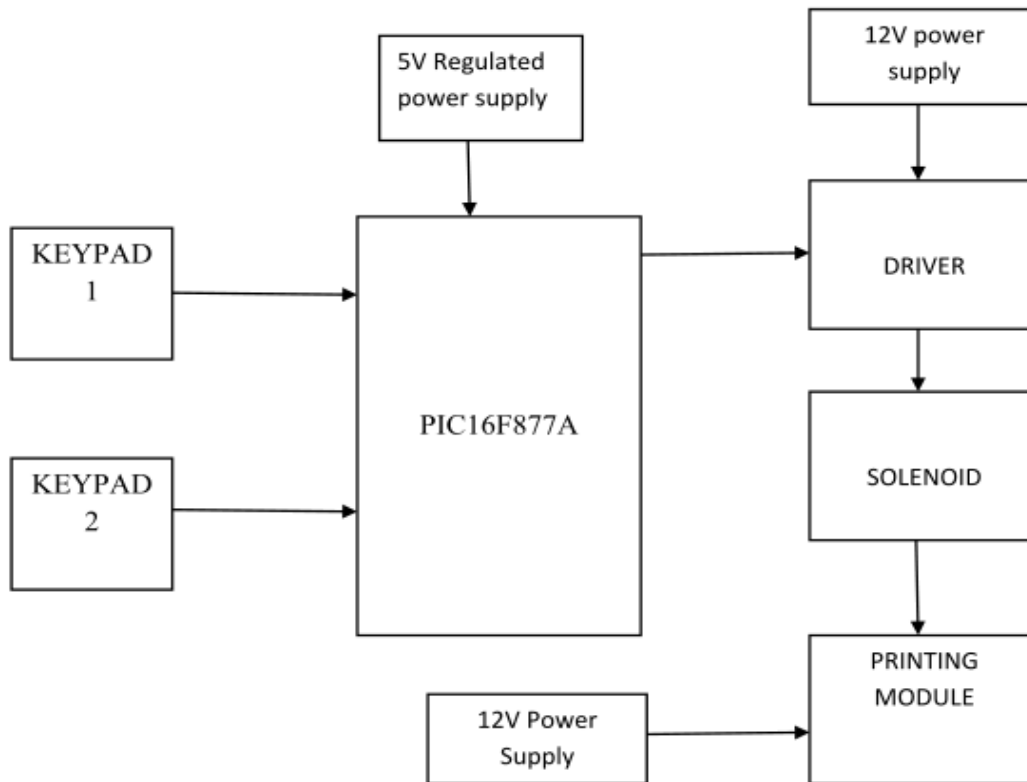


Fig.3: Block diagram of the proposed system

**Input section:** The input to the system is provided through two keypads connected through the ports B,A and E. Two 4\*4 keypads are used, hence 64 letters can be realized. To interface a 4\*4 matrix keypad to PIC16F877A, each rows of the keypad are connected to an output port and columns are connected to an input port. To detect a pressed key, the microcontroller grounds all rows by providing 0 to the output latch, and then it reads the columns. If the data read from the columns is D3-D0=1111, no key has been pressed and the process continues until a key press is detected.

However, if one of the column bits has a zero, this means that a key press has occurred. For example, if D3-D0=1101, this means that a key in the D1 column has been pressed. After a key press is detected, the microcontroller will go through the process of identifying the key. Starting with the top row, the microcontroller grounds it by providing a low to row D0 only; then it reads the columns. If the data read is all 1s, no key in that row is activated and the process is moved to the next row. It grounds the next row, reads the columns, and checks for any zero. This process continues until the row is identified. After identification of the row in which the key has been pressed, the next task is to find out which column the pressed key belongs to.

**Printing section:** The printing section consists of a printing module in which the paper is given a support. It also controls the horizontal and vertical movement of the paper. This is done through two DC motors connected to the port C of the PIC microcontroller.

**Output section:** This section mainly consists of a solenoid box where 6 solenoids are arranged as a 3\*2 matrix. The output pin of the PIC microcontroller is connector to a MOSFET (IRF 530) which served as driving circuit for the solenoids. Logic high at the output pin of the PIC will enable the MOSFET, which acts as a switch. This will then drive the current to each of the solenoids and excites it. The six solenoids will be excited corresponding to the Braille characters regarding the pressed key. The impressions of these keys are obtained on a paper.

#### IV. ALGORITHM AND FLOWCHART

##### ALGORITHM

1. Start
2. The motor which is responsible for the vertical motion of the paper rotates as the paper is rotated. This will make the solenoid box above the first position in the first line of the paper.
3. A variable, say k, is initialized to count the number of letters being printed.

4. A key is pressed in the keypad. The pressed key is scanned using the normal matrix interfacing technique. Here a single press of the key indicates a character and double press of the same key represents another character.
5. The solenoid corresponding to the pressed key is excited.
6. Then the motor which is responsible for the horizontal motion of the paper is rotated. This will move the solenoid box to punch the next character.
7. The value of k is now incremented. The system is designed to handle 4 characters in each row of the paper. When the value of k reaches 4, the motors rotates such that the solenoid moves to the first position of the very next line.
8. If the value of k is not equal to 4, the steps from 3 repeats.

## FLOW CHART

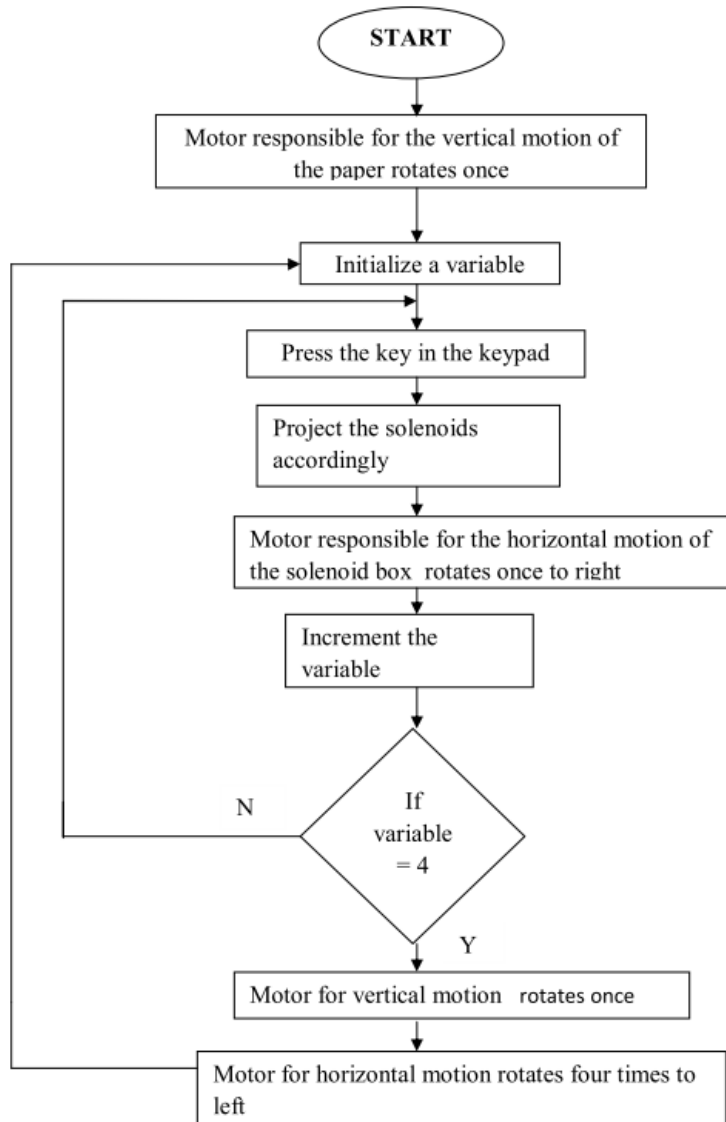


Fig.4: Flow chart of the proposed system

## V. CONCLUSION

Blind people face a great difficulty in receiving proper education due to the lack of low cost technological support. Most of the teachers who worked with blind students knew how to read Braille, and therefore could comfortably create Braille materials and this doesn't go for newer technologies. This system tries to bring out a relatively inexpensive, light weight, reliable and easily maintained Brailier. The blind people can both read and practice Braille scripts in Malayalam language. This system can be made an effective and efficient tool which can be used by the blind people so that communication can be made easier for such people.

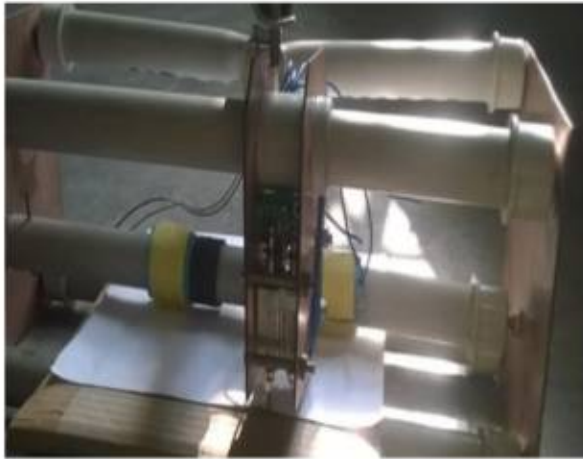


Fig.5: Printing Module



Fig.6: Keypad Interfacing

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