Self Learning Braille Keyboard

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Abstract: The project consists of Braille keyboard and learner. A Braille learner enables visually impaired people to learn Braille. The learner consists of 6 vibrating motors arranged in a 3x2 matrix as a Braille cell. A Braille keyboard is specially designed and constructed to provide easy typing technology for the visually impaired. There are totally 6 logical sensing switches that are used for acquiring the characters. The whole keyboard works based on Braille system. There are also five other specially used switches like SHIFT (Number Alphabet toggle button), SPACE, BACK SENSE, CAPS LOCK and SPEAK. This keyboard is a device made of logical switches and uses Braille system technique for sensing the characters. In this system, the sensors are aligned according to the Braille language i.e. alphabets or numeric/special characters. The main advantage of this project is that the visually impaired will also get to learn Braille and can also use this as a keyboard to type. This keyboard is interfaced with a computer in a similar way to that of the primary keyboards that are available Keywords: Visually impaired, hardware keyboard, See thro' touch, logical switches, Rows & Column sensors, modes of operation Braille language).

I. Introduction

Braille has been central to the literacy of blind and visually impaired people since it was first developed by Louis Braille in the 1800s.As a system of touch reading and writing that uses raised dots to represent letters of the alphabet, it is also used to represent symbols, numbers and music. Learning Braille also allows users to develop an understanding of the formal structure of language, including spacing, formatting and grammar. For some subjects, notably science, mathematics and foreign languages, Braille is essential in comparison with alternative methods, such as audio learning. Perhaps unsurprisingly, greater literacy through Braille has been shown to improve employment and life chances for blind and visually impaired users, even though employment rates remain disproportionately low for visually impaired people overall. However the context for Braille learning and teaching is changing rapidly. Technological developments, especially the development of audio texts, synthesized speech and higher magnification, have opened up opportunities for blind and partially-sighted people to access much more written material. At the same time, concerns have been raised about over – reliance on audio and synthesized speech in education, resulting in a decline in Braille.

II. Material And Methods

1. ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2. ARDUINO MICRO
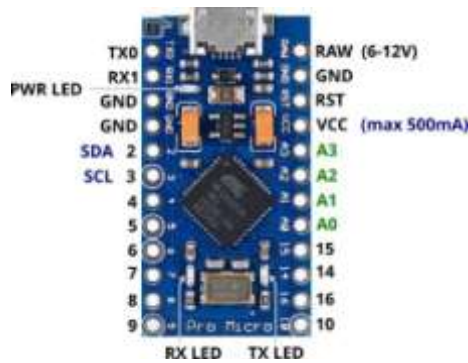
The Pro Micro has core IC of ATmega32U4 on board. The USB transceiver inside the 32u4 allows us to add USB connectivity on-board and do away with bulky external USB interface

3. PUSH BUTTONS

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal.[1] The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state.

4.VIBRATING MOTORS

A vibrating motor is essentially a motor that is improperly balanced. In other words, there is an off-centered weight attached to the motor's rotational shaft that causes the motor to wobble. The amount of wobble can be changed by the amount of weight that you attach, the weight's distance from the shaft, and the speed at which the motor spins. This type of motor can be used affixed to all kinds of objects, which will cause them to vibrate and move freely about. This is a quick and dirty way to get a Simple Bot to move about, but not exactly the most elegant. Vibrating motors can be found inside cell phones, pagers, gaming controllers, and personal massagers.

5. SPEAKER

Digital speakers or Digital Sound Reconstruction (DSR) system are a form of loudspeaker technology. It is used for audio output purpose.

6. OTHER COMPONENTS
1. Resistors (1k)
2. Capacitors (o.1uF0
3. Transistors (2N2222)
 4. Diodes (1N4001)
5. USB wires
6. Perf board

Procedure methodology
    Our system is self-sufficient to teach Braille language. Blind person does not require any help of other person for the same. We will develop a controller based system which will be connected to the pc. When the software will start the system will announce the name of the character and on the hardware we will generate the same character in Braille format with the help of 6 sensors.
    Blind person can touch and feel the character to understand it. The process will repeat for all the characters. Our system will also help the blind person to cross check what he have learn. With the help of keyboard blind person will generate the character learnt by him.
    The keyboard can perfectly generate a-z, A-Z, 0-9 and some special characters. Other than this we have push buttons for enter (newline), space and backspace. So it can perform almost all actions that a regular keyboard performs.

III. Result

LEARNER
    The project is based on Atmega328P microcontroller. It is the controlling unit. The learner is used for self-learning. In this the device creates vibration in the 6 Braille pattern cell and also announces the letter or number which it will display through a speaker. In this way user can learn using Braille box. LEDs are also used to assist vibration patterns.

KEYBOARD
    The project is based on Atmega32U4 microcontroller. It is the controlling unit. It works as an actual keyboard. The user presses combination of switches in the Braille cell to produce an alphabet, a number etc. There are also some special switches with functions upper case alphabets, lower case alphabets and numbers. This switches are also used for enter, spacebar and backspace functionalities.

IV. Discussion
    The traditional way of learning Braille language is known by all of us. But there is no system developed to learn the Braille language on our own. Schools for blind are available all over and they provide regular courses for blinds. There is no automation done to learn Braille language. Louis Braille, the creator of Braille, was a student at the first school for the blind in Paris, France. Braille is a tactile writing language of raised dots, mainly used by the blind and visually impaired. It is developed for our haptic perception, a combination of the sense of touch, movement and finger pressure. The dots are arranged in cells. Every cell consists of a majority of six dots in a small rectangle. A fingertip can feel the whole cell at once. For enhancing the interaction with the computers by the visually impaired there were many systems that were created like E touch, speech recognition interacting system etc. Several companies today market computer programs that allow

a blind person to use a standard computer. These computer programs are called "speech recognizers". A speech recognizer is itself a standard Windows computer application, but its job is to run alongside the other programs running on a computer and makes the blind person to speak out to enter the text on the screen. Because a blind person cannot see what is on the screen, a screen reader typically has a built-in speech synthesizer which, although perhaps sounding a bit like a robot, speaks information to the user through the normal sound speakers of the computer itself. The speech recognition system is highly complicated to work on as everyone needs to wisp the exact language.

V. Conclusion

The proposed system can be designed in such a way to meet the requirements of the visually impaired people. It is an easy to use device with self-learning and typing features which provides a platform for the blind.

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