

BRAILLE ALPHABET READER

Anže Rom

Supervisor: Marko Rožič MSc, Srednja šola Črnomelj, Slovenia

1. Introduction

Blind people can't use their vision, so a special type of communication was made for them – it is called a Braille alphabet, made of small convex dots. One slides their finger across the dots and from combination of points they recognize letters. Letters are made of two columns and each column has three dots, so each letter contains minimum 1 to maximum 6 dots (Figure 1) [1]. Every punctuation mark and symbol has its own specific combination too.

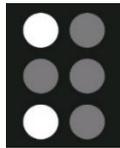


Figure 1 – Letter “k” written in Braille alphabet (whiter dots are more convex)

More and more often Braille alphabet is used in everyday life, for example on drug boxes. Because of that, blind person can be sure which drug has to take and cannot make a mistake. Nevertheless, learning to read in Braille alphabets proves not to be an easy task, the idea to make a device that would make it easier emerged. The goal of this project was to design a device that would read the Braille alphabet as a support to blind persons.

2. Theory

Special plastic holder for three wires is placed on an index finger. When finger is sliding above Braille letter, convex dots move each wire away from the finger. Weak electric pulses created at that moment are analyzed with Arduino (Figure 2). Arduino is the core of the device. Software, written in “C” recognizes each combination of electrical pulses and proper letter is displayed on screen.

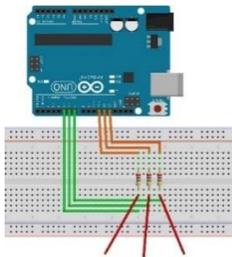


Figure 2 – Red wires are sensitive switches; touching them Arduino detects combination for every displayed letter

Using higher resistors, switches became more sensitive and reading became faster. Switches are sensitive in touch with human skin. Finger behaves as a capacitor, which is charged or discharged through a resistor. Time difference between both two signals, directly from reference pin of

Arduino and of wire touching the finger is an information whether index finger has touched convex dots of Braille alphabet (figure 3) [2]. Each dot has its own value, so when wire hits dot, device knows which dot is hit, so it can display the letter.

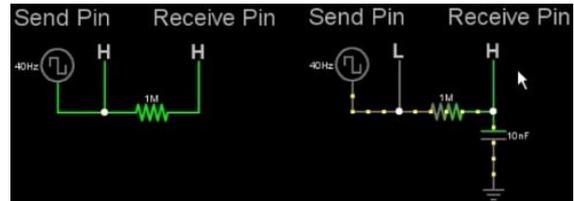


Figure 3 – Synchronous modification of electric pulses in each pin (left) is changed if wire touches finger (right) [2]

3. Results

Figure 4 shows demonstration how to use invented device. Index finger moves above convex Braille alphabet and dots move wires. Arduino detects electrical pulses and software displays letter on the screen.



Figure 4 – Practical reading Braille alphabet with invented reader

With some improvements and optimization, teachers, who teach blind people won't have problems anymore to read Braille alphabet.

4. Conclusion

The device for reading Braille alphabet was successfully designed which can drastically improve the quality of life of blind people, but also has a huge potential in use in different fields. Modified versions of this device can be used for decoding Morse alphabet or measure conductivity of different materials. With added speaker and more wires electrical piano can be made. How to use this device depend on creativity.

5. References

- [1] Birch, B. (1997). Louis Braille: slepi francoski deček, čigar izum pomaga milijonom slepih, da lahko berejo, Celjska Mohorjev družba, Celje.
- [2] CapSense: Capacitive Switch. (31. 7. 2013). Got from <https://www.youtube.com/watch?v=jco-uU5ZgEU>, 14. 3. 2018.