USING MACEDONIAN BRAILLE PATTERN FOR BRAILLE DEVICES, APPLIED ON BRAILLE 200 EMBOSSER PRIMER

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ABSTRACT

Macedonian blind people are using their Braille pattern for reading of Cyrillic alphabet, but unfortunately, there is not standardized Macedonian Braille pattern. .

The pattern shown in this paper is used by the blind persons from Macedonia and can be proposed as standard. This pattern can be used for solutions related to Braille signs for Macedonian alphabet.

Recent purchase of Braille 200 embosser for the school of visually impaired persons met a problem with embossing this pattern. This paper shows results of the research in resolving this problem and it can be used as proof of concept.

Keywords. Braille, Macedonian, Cyrillic, Embosser, Pattern

I. INTRODUCTION

The Braille system is a method that is widely used by blind people to read and write, and was the first digital form of writing [1].

It was based on a method of communication originally developed by Charles Barbier in response to Napoleon's demand for a code that soldiers could use to communicate silently and without light at night called “night writing”. Barbier's system of sets of 12 embossed dots encoding each letter was too difficult for soldiers to perceive by touch, and was rejected by the military. In 1821 he visited the National Institute for the Blind in Paris, France, where he met Louis Braille. Braille identified the major failing off the code, which was that the human finger could not encompass the whole symbol without moving, and so could not move rapidly from one symbol to another. In 1825 he modified the code to use a 6 dot cell and proposed the Braille system which revolutionized written communication for the blind [2].

At first the system was a one-to-one transliteration of French, but soon various abbreviations and contractions were developed, creating a system much more like shorthand.

Each Braille character, or cell, is made up of six dot positions, arranged in a matrix containing two columns of three dots each. A dot may be raised at any of the six positions to form 64 (26) possible subsets, including the arrangement in which no dots are raised. For reference purposes, a particular permutation may be described by naming the positions where dots are raised, the positions being universally numbered 1 to 3, from top to bottom, on the left, and 4 to 6, from top to bottom, on the right. The lines of horizontal Braille text are separated by a space, much like visible printed text, so that the dots of one line can be differentiated from the Braille text above and below. Punctuation is represented by its own unique set of characters.

Braille may be produced using a slate and stylus [3] in which each dot is created from the back of the page, writing in mirror image, by hand, or it may be produced on a Braille typewriter or Perkins Brailler, or produced by a Braille embosser attached to a computer. It may also be rendered using a refreshable Braille display.

Braille has been extended to an 8-dot code, particularly for use with Braille embossers and refreshable Braille displays. In 8-dot Braille the additional dots are added at the bottom of the cell, giving a [4 x 2] matrix. The additional dots are given the numbers 7 (for the lower-left dot) and 8 (for the lower-right dot). Eight-dot Braille has the advantages that the case of an individual letter is directly coded in the cell containing the letter and that all the printable ASCII characters can be represented in a single cell. All 256 (28) possible combinations of 8 dots are encoded by the Unicode standard. Braille with six dots is frequently referenced as Braille ASCII.

II. 8-DOT MACEDONIAN BRAILLE PATTERN

Macedonian blind people are using their specific Braille pattern and unfortunately it is not standardized yet. It covers Cyrillic alphabet on a basis of the standard Braille pattern for alphabet letters. An 8-dot matrix is used for representing the Macedonian letters. This Braille pattern used by Macedonian blind people for reading Macedonian Cyrillic alphabet is shown in Figure 1.

As it is shown in Figure 1, the 7th dot is gray which means that it is used for distinction of capital and lower letters. This corresponds to one additional advantage of the 8-dot Braille pattern vs. 6-dot Braille pattern – capitalization of the letters. Capital letters in 6-dot Braille pattern are represented as corresponding lower letter with leading dot.

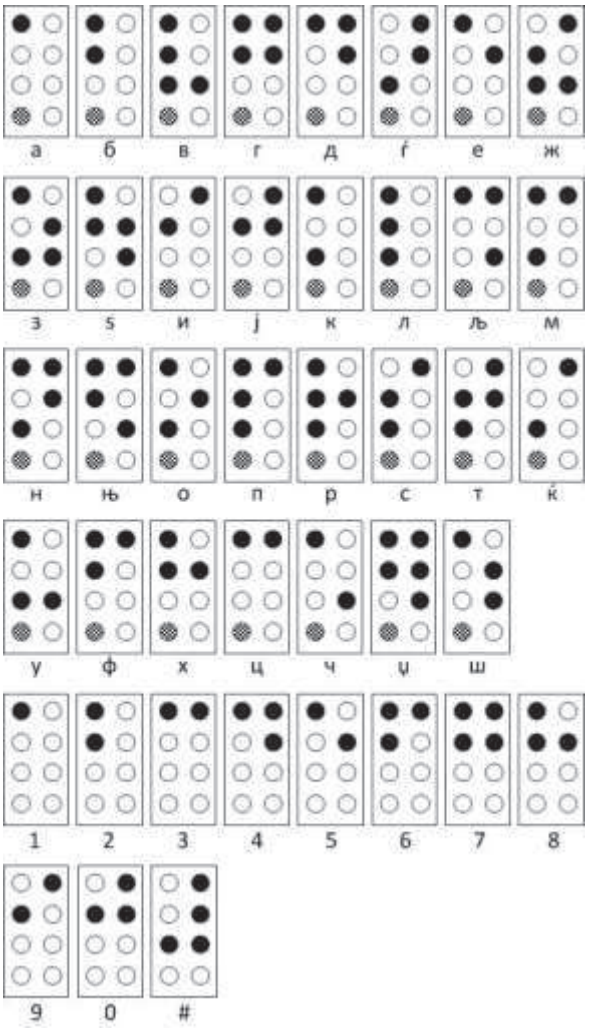

Figure 1: Braille pattern used by Macedonian blind people for reading Macedonian Cyrillic alphabet.

III. Braille 200 Embosser

In the 2010, Macedonian government purchased Braille 200 Embosser produced by Braille-Norway, for the school of visually impaired persons.

It is a compact interpoint (double-sided) Braille printer for large volume production with these specific format characteristics [4]:

Chars / line: 10 - 42 characters
Sheet length: 4 - 14 inches
Sheet width: 140 - 330 mm
Page layout: Normal / Z-fold
Page 1: Up / Down
Print Mode: Single / Interpoint
Page Length: No form feed / Normal / Normal -1 to -9 lines
Braille cell: Standard medium 6 or 8 dot
Line spacing: From 0.3175 to 10.16 mm. Standard is 5.08 mm
Paper Weight: 120 - 180 g/m², Recommended 150 g/m²

This embosser comes without driver, because it works via Generic / Text Only printer driver, which led to problems with embossing a Cyrillic letters and formatting the page, especially when the user tries to print from a different application.

Each Macedonian letter corresponds to some Latin alphabet Braille character. The pattern for the numbers and punctuation signs is the same as in Latin Braille pattern. TTF (True Type Fonts) fonts were very popular once for all computer users. The mapping used for the characters for the Cyrillic letters into Latin letters is used in developing this Macedonian Cyrillic Braille pattern. Nowadays, standardized Macedonian keyboard is used, which yields an expectation that text send to Braille 200 Embosser, might be also in this standardized Unicode Macedonian character set[5]. Therefore, text send to the Embosser must be first converted to TTF, and then sent to printer.

However, since the Embosser itself has a set of characters it receives, so that each letter would corresponds a specific "Braille letter" it is possible to merge both true type font and standardized Unicode characters into one converter that will discard the origin of the characters and will send them directly to the Embosser in a form that will be recognized.

Basically that would require a construction of a "Macedonian Braille 200 Driver".

The main idea is that the driver must ignore the origin of the text, and act for TTF's just as it acts for Unicode. That would mean that the intercepted symbol of any origin will be connected with its pair of other origin with a logical "or" before converting. For example letter "Д" of the Unicode character set will be connected with letter "D" of the true type fonts and both letters will be converted into the appropriate Braille 2000 character or character group, in this case that would be ".d".

IV. Temporary Substitution

Unfortunately the driver competition will not be possible soon, so instead, a quick and usable Macro procedure that just converts the symbols to required Braille symbols can do just about enough before the driver is complete.

The idea is that for the moment, while working on the driver, the text needed to be printed as Braille text will have to be copied into Microsoft Word of any version, and from the application, using the installed Add-in the text will be converted to appropriate text for the Braille 200 Embosser. This temporary solution encounters much of what is planned in the final driver solution, such as variable number of characters per row and rows per sheet that are within the limitations of the Braille Embosser.

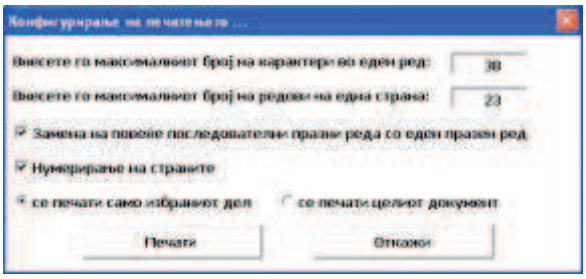

Figure 2: Some options offer before the text is converted for the printer.

Enchantments do exist in the solution, such as “Paper Saving”, “Page numbering”, as given in figure 2. The solution works on selected text, whole document or the contents of the clipboard, assuming that the contents of the clipboard are text.

Although shortcuts for every action are implemented, the solution is, and must be just temporary, simply because it requires some of the visually impaired persons to work with it, and regarding usual recommendations, such as using large fonts, this requires basic computer knowledge, for example copying or pasting text. An example of given and prepared text is shown on figure 3.

```
Стандарден Македонски Unicode
текст пренесен на Браилов печатар
True Type font prenesen na brailov tekst

.standarden .makedonski .unicode
tekst prenesen na .brailov
pe*atar
.true .t\pe font prenesen na
brailov tekst
```

Figure 3: Example of text preparation. The Add-In creates a new temporary document which is appropriate for the embosser, and prints it.

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