

Development of a Novel Keyboard Interface Unit for Writing Quran using Computer

Mussa A. Abudena¹, Shihab A. Hameed², Aisha H. Hashim³, Othman O. Khalifa⁴

Department of Electrical and Computer Engineering, IIUM University, Malaysia

Abstract— There is a lot of computer keyboard layouts in different languages were produced including Arabic keyboards. Up to date, there is no any type of keyboards which used to write holy Quran according to Uthmanic script – that is the standard script to writing Quran. In North Africa they are using special Quranic font called Al-dani. This paper focus on designing and implementing special Quranic keyboard based on Al-dani. To use this font with more accurate positioning of the diacriticals over the letters or below of them, and to achieve the optimum connectivity and kerning between the letters, distinctive type of keyboard should be used to interface with Al-dani Quranic font to facilitate Quran text writing. This paper explains the techniques used to development a keyboard interface unit for writing Quran using computer. Sample of results for using of this keyboard are presented.

Keywords— Arabic keyboards, Computer keyboards, MountFocus Keyboard Designer, Quranic fonts.

I. INTRODUCTION

The Arabic script is used for many languages and is the second most widely used script in the globe. Writing Quran requires special Arabic fonts (known as Quranic fonts) differ from the original one. There are many difficulties and problems related to writing Quran by hand, and most important are: First, the Quran written by one person may lead to delays in the writing of the Quran, especially in the case of illness or exposure to compelling circumstances prevent him from completing his work. Second, difficult to correct errors when writing the Quran handwritten on paper. Third, regardless of the accuracy of the writer, there is a clear deficiency in the consistency of words and lines. [1] However, due to the complexity of producing high quality fonts, the support for Arabic digital typography has been too weak. Open Type is currently the de facto standard font technology. It has many features to sustenance a wide variety show of scripts, still has its limitation for Arabic. The most significant restriction are probably the following two: First, the concept of alphabetic character box seat connecting together via other boxes of extension virgule is not suitable for highest quality

Arabic typesetting. Second, the limitation in using of pre-stored glyphs for different ligatures. The Arabic alphabet, although consisting of 28 letters, depends on 17 different skeletons. The dots added above or below some of these skeletons are the ways of differentiating one letter from another. [2] After a brief period of the spread of computers possible entry languages that use the Latin alphabet to the computer first. Then emerged the idea of introducing other languages after making multiple developments in the installation of computer programming, and one of these languages: Arabic language, but there were many problems relating to the composition of the Arabic font within the Computer. [3] There is a few of computer Quranic fonts, here three of them. First, AlQalam font: It is a research project carried out at the Electronics and Electrical Communications Department, Faculty of Engineering, Cairo University. AlQalam is freely available system intended for typesetting Quran (using script Al-khrraz), other traditional texts, and any publications in the languages using the Arabic script. It aims to achieve an “Naskh” font with quality close to that of Arabic calligraphers, by modelling the pen nip and the way it is used to draw curves as closely as possible using a font description language -METAFONT. It is based on the TEX and Metafont open source typesetting and font design systems. [2] Second, King Fahd glorious Quran printing complex font: One of the fonts of computer coding compatible with the international Unicode, assigned to write the text of the Holy Quran corresponding to the Uthmanic font of mushaf prophetic city for narration (riwayat) HAFS. [4] Third, Al-dani Quranic font: It is a research project carried out at the Electrical and Computer Department, Faculty of Engineering, IIUM University. It had designed and implemented using FontCreator software [5]. This font basically assigned to write the text of the Holy Quran corresponding to the Uthmanic font (Al-dani) of mushaf Aljmahieriah for narration (riwayat) Qaloon. [1] [6]

II. INVESTIGAION

Before we present of framework in detail, we briefly discuss a summary of some published work in producing and

development of computer keyboard layouts. We identify the key functionalities provided through the investigation that serve as the preliminary functionality requirements for our framework.

1. Latin Keyboards

1.1. Standard Keyboard Layouts

This section describes the physical layouts found on commonly available keyboards.

1.1.1. Keyboard Sections

When discussing keyboard layouts, it is convenient to divide the standard keyboard into distinct sections and to label each row.



Fig. 1: The five general sections of a standard keyboard

These keyboard sections are:

- The Alphanumeric section: is the main part of the keyboard and is where most of the keyboard variation occurs. When a user selects a keyboard layout, it is the keys in this sections that are most affected.
- The Control Pad and Arrow Pad sections: contain the arrow keys and other editing keys.
- The Numpad (also known as the "numeric keypad" or "number pad"): contains number and math keys to make it easier to enter numeric data.
- Finally, the Function section: contains miscellaneous function keys and special keys like Escape. To make it easier to identify keys, the rows on the keyboard are named starting with "A" for the bottom row up to "E" for the top row. The row of keys in the Function section are considered to be in row "K". These row names are consistent with those given in [ISO9995-1]. Note that many keyboards (both modern and legacy) have extra keys that do not fit neatly into the above sections. [7]

1.1.2. Standard "101" Keyboard Layout

The standard "101" keyboard (commonly referred to as the "US layout") is the only layout that has a "Backslash" key (labelled \) above a single-row Enter key. All the other layouts omit this key and expand the Enter key to occupy two-rows.

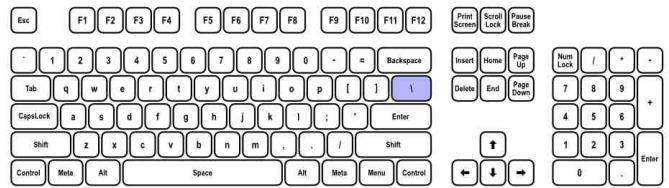


Fig. 2: Standard "101" keyboard layout showing unmodified US key values

Modern standard "101"-layout keyboards actually contain 104 keys: 61 keys in the alphanumeric section and 43 keys in the numpad, control pad, arrow pad and function sections. The "101" name for this keyboard layout dates to the time when this standard keyboard did in fact contain 101 keys. The two Meta keys (commonly given an OS-specific label), and the Menu key were added later to bring the total to 104 keys.

1.1.3. Standard "102" Keyboard Layout

The standard "102" keyboard is common throughout Europe and adds a key that doesn't exist on the "101" layouts: The "IntlBackslash" key (labelled \) next to the left shift key.

A second key is also added (labelled #~ on a UK keyboard) which is partially tucked under the Enter key. This key is encoded as "Backslash", using the same code as the \ key found on the "101" keyboard layout. According to [USB-HID], the US \ and UK #~ are actually two separate keys (named "Keyboard \ and |" and "Keyboard Non-US # and ~"), but since these two keys never co-occur on the same keyboard most platforms use the same scan code for both keys, making them difficult to distinguish. It is for this reason that the code "Backslash" is used for both of these keys.

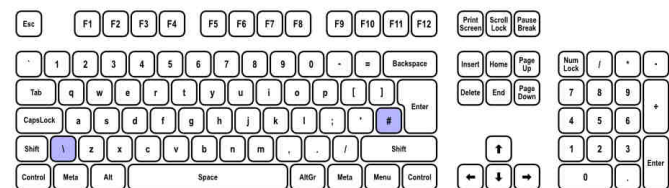


Fig. 3: Standard "102" keyboard layout showing unmodified UK key values

Modern "102"-layout keyboards contain 105 keys: 62 keys in the alphanumeric section and 43 keys in the numpad, control pad, arrow pad and function sections. [8]

2. Arabic Keyboards

The layout of the Arabic keyboard is derived from the Arabic typewriter keyboard's layout. In the 1970s and 1980s, many computer companies developed more than 20 variants for this layout. These various variants had consistent allocation for some letters (namely ا ب ت ث ج ح خ س ش ص ض ع غ ف ق ك ل م)

ن). However, they have differences in allocating the other letters particularly the letters in the lower row (such as ذ ز ظ و ؤ ذ ا د ا ي ر ط ء). Some of the famous keyboard layouts in the late 1980s are the layouts of Microsoft Arabic Word, Apple MAC, Sakher, AMEER, ALIS, and Nafitha.

To solve this chaos created by the existence of many Arabic keyboard layouts, the Arab Standardization and Metrology Organization (ASMO) developed a standard for the Arabic keyboard layout shown in Figure4 (ASMO 1987) [9].

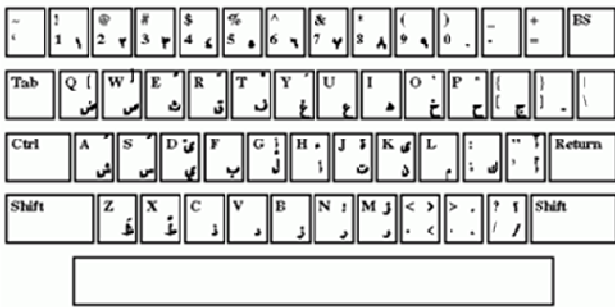


Fig. 4: ASMO 663 Arabic Keyboard

This keyboard standard supports the ASMO standard for the 7-bit Arabic characters code (ASMO 1985). However, this keyboard standard was not used by the computer industry and the market adopted instead the currently used Arabic keyboard layout shown in Figure5 [10].



Fig. 5: IBM Arabic Keyboard

This keyboard layout gained wide acceptance in PCs and servers over other layouts when Microsoft adopted it for its Arabized products. Another Arabic keyboard layout currently in use is the layout shown in "Fig. 6".



Fig. 6: Apple MAC Arabic Keyboard

This layout is used in Apple MAC computers the common Arabic keyboard layout is not optimized for performance and also has many obvious drawbacks. For example, Letter Thal "ذ" is placed in an awkward place in the top-left corner of the

keyboard despite its frequent use. This letter is more frequently used than other well-positioned letters such as Letter Ghain "غ". Moreover, the two-letter combination Lam-Alif "لا" has one key dedicated for it despite the fact that it is not as frequent as other letter combinations. [11]

3. Quranic Keyboards

For writing Quran using computer, we need two special Quranic computer applications, first is Quranic computer font, and the second is Quranic computer keyboard. There is a few of computer Quranic fonts, here three of them.

3.1. AlQalam font

It is a research project carried out at the Electronics and Electrical Communications Department, Faculty of Engineering, Cairo University. AlQalam is freely available system intended for typesetting Quran (using script Al-khrraz), other traditional texts, and any publications in the languages using the Arabic script. It aims to achieve an "Naskh" font with quality close to that of Arabic calligraphers, by modelling the pen nip and the way it is used to draw curves as closely as possible using a font description language -METAFONT. It is based on the TEX and Metafont open source typesetting and font design systems. [2]

3.2. King Fahd glorious Quran printing complex font

One of the fonts of computer coding compatible with the international Unicode, assigned to write the text of the Holy Quran corresponding to the Uthmanic font of mushaf prophetic city for narration (riwayat) HAFS. [4]

Al-dani Quranic font

It is a research project carried out at the Electrical and Computer Department, Faculty of Engineering, IIUM University. It had designed and implemented using FontCreator software [1]. This font basically assigned to write the text of the Holy Quran corresponding to the Uthmanic font (Al-dani) of mushaf Aljmahieriah for narration (riwayat) Qaloon. [5] [6]

Table.1: Summary of Quranic fonts

| No. | Font Developer and Name | Year | Technique | Strong | Limit |
|-----|--------------------------|------|------------------|-------------------|---------------------------|
| 1 | Cairo University AlQalam | 2005 | TEX and Metafont | Multipurpose font | For Quran (HAFS) Botchery |

| | | | | | |
|---|--|------|-------------------------|----------------------------------|---|
| 2 | King Fahd complex KFGQPC Uthmanic HAFS | 2009 | Unicode and FontCreator | Good quality | For Quran only (HAFS) No user interface |
| 3 | IIUM University Al-dani Quranic font | 2015 | Unicode and FontCreator | Good quality With user interface | For Quran only (Qaloon) |

However, there is no Quranic computer keyboard up to date except Al-dani Quranic Keyboard that was implemented at the Electrical and Computer Department, Faculty of Engineering, IIUM University, that is the essence of this paper.

III. AL-DANI QURANIC KEYBOARD

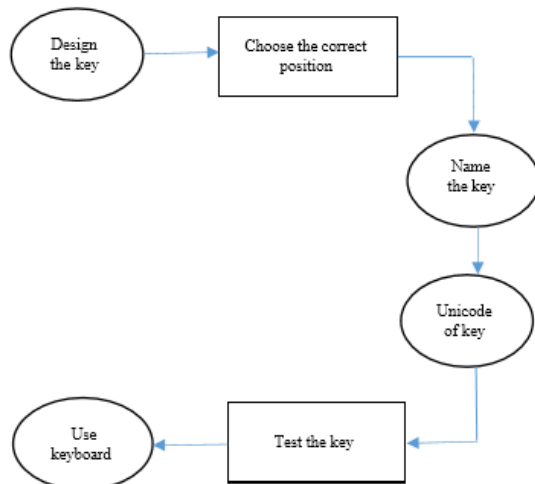


Fig. 7: Block Diagram for Al-dani Quranic keyboard

1. MountFocus Keyboard Designer:

The MountFocus Keyboard Designer is a tool for creating virtual keyboards on the Windows platform. Keyboards created using the MountFocus Keyboard Designer can be used with any Windows application in a touch-screen or normal environment. That makes it ideal for situations where a physical keyboard is either not available or not desired. The MountFocus Keyboard Designer was designed to allow developers or users of Windows applications to design their own on-screen virtual keyboards. The design was originally made for Point of Sale applications, but it is suitable for other uses as well. Infokiosks, remote customer terminals, or any application where you do not want the user to have a physical keyboard available, are ideal situations for the MountFocus Keyboard. Multiple "pages" allow context sensitive keyboard

layout allowing the user to press "legal" keys only. OLE support allows other applications to select pages and control the appearance of the keyboard. Easy deployment of your custom made keyboards. Single or multiple keystrokes can be sent from a single key press. Multiple objects can be placed on keys, the keyboard surface, page controls, and panels. Graphics or text can be used. Copy keys from the integrated key pool for fast and easy creation of new keyboards. The most flexible and powerful virtual keyboard designer available. Excellent for touch-screen, Point of Sale and similar applications_[12]. Al-dani Quranic keyboard was designed and implemented using MountFocus Keyboard Designer.

2. The Screenshots of MountFocus Keyboard Designer appear in "Fig. 8"

Where: "Fig. 8a" is the Screenshot of MountFocus Keyboard Designer. "Fig. 8b" is the Screenshot of key design. "Fig. 8c" is the Screenshot of naming the key. "Fig. 8d" is the Screenshot of assign Unicode for the key. "Fig. 8e" is the Screenshot of complete Al-dani Quranic keyboard.

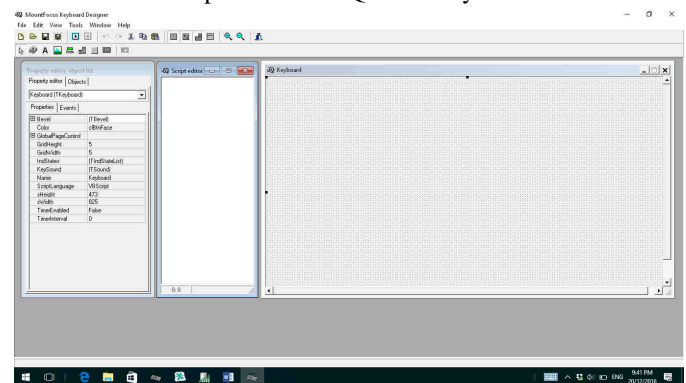


Fig. 8a: The Screenshot of MountFocus Keyboard Designer.

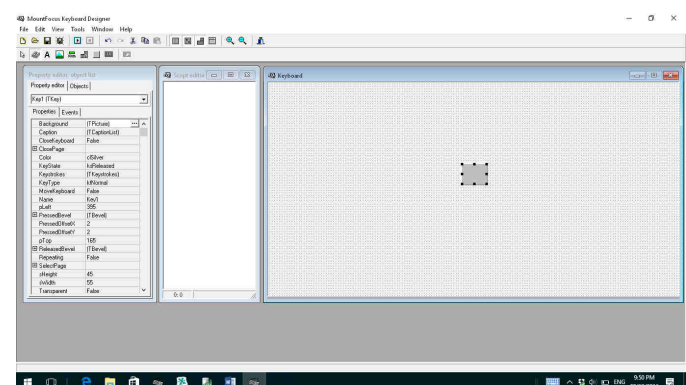


Fig. 8b: The Screenshot of key design

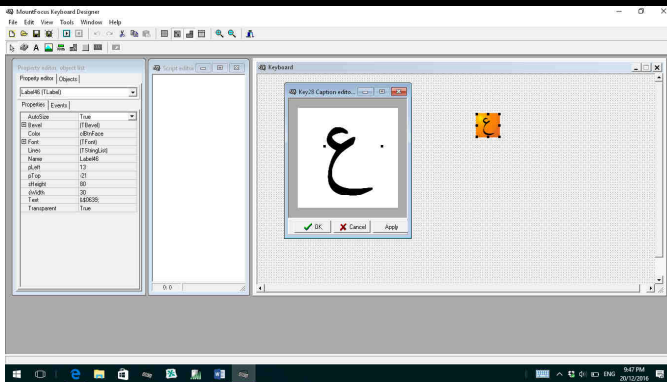


Fig. 8c: The Screenshot of naming the key

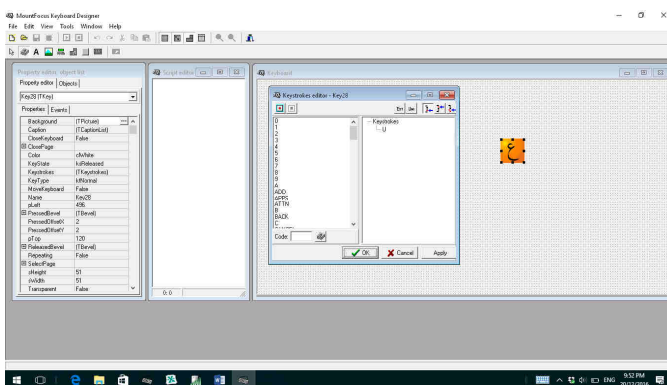


Fig. 8d: The Screenshot of assign Unicode for the key



Fig. 8e: The Screenshot of Al-dani Quranic keyboard.

3. Flowchart for design and implementation of Al-dani Quranic keyboard

"Fig. 9" illustrates this flowchart.

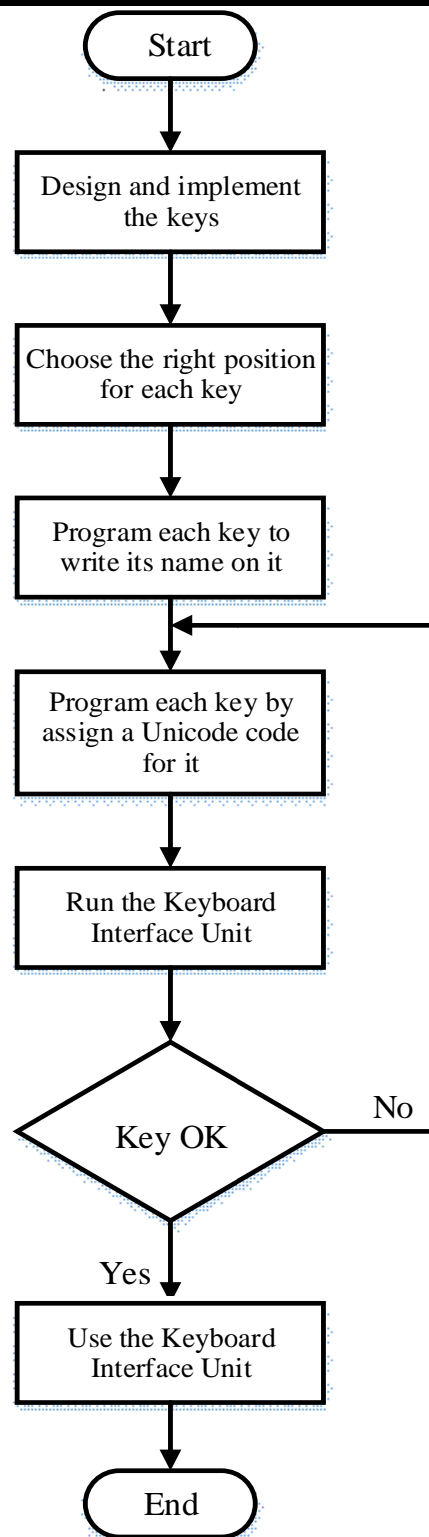


Fig. 9: Flowchart for Keyboard Interface Unit

IV. RESULTS

Using Al-dani Quranic keyboard, we employ Al-dani Quranic font very well, such that the marks and diacriticals appear at the right position over or below the letters. For example, observe the marks and the diacriticals over/below these letters.



Fig. 10: Letters with diacriticals

Now, see letters how consist words when connected together.

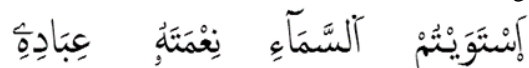


Fig. 11: Words written by Al-dani Quranic keyboard.

As a sample, these lines from Quran written by Al-dani Quranic keyboard.

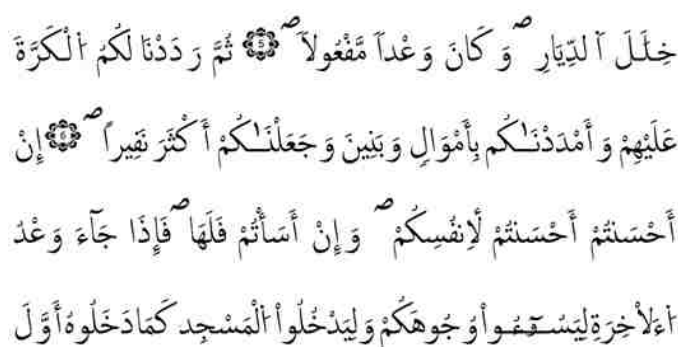


Fig. 12: Sample of Al-dani Quranic font written by Al-dani Quranic keyboard.

V. CONCLUSIONS

In this paper, we explained the types of computer keyboards including Arabic keyboards. There are few attempts for writing the Quran using computer, among them: AlQalam font, King Fahd glorious Quran printing complex font, and Al-dani Quranic font. These approaches are discussed. In addition, we mentioned a summarized view about MountFocus Keyboard Designer. Moreover, we gave a short explanation for design and implementation of Al-dani Quranic keyboard using MountFocus Keyboard Designer. This paper intensify the importance of Al-dani Quranic keyboard to write Quran using Al-dani Quranic font. As a future work, a complete keyboard design technique to write the whole Quran with other narrations in less time will be finalized.

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