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Information technology — Virtual keyboards user interfaces —

Part 2:
On-screen keyboards with direct touch interface

Technologies de l'information — Interfaces utilisateurs des claviers virtuels —

Partie 2: Claviers sur écran dotés d'interface tactile

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 35, *User interfaces*.

A list of all parts in the ISO/IEC 22121 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Virtual keyboards can be difficult for users as different types of keyboards and functionalities exist, and they are spreading exponentially; with the rise of tactile mobile phones and devices, most users in the world will have to use such interfaces for communication, work or leisure.

The most widespread type of virtual keyboard is found on devices that use both a screen to display the virtual keyboard (on-screen keyboard) and a built-in, direct touch interface to operate it.

Devices that use an on-screen keyboard with a direct touch interface include at least one touchpad screen that allows both the display of the keyboard interface and the interaction with the user. These features are mostly found in handheld devices such as mobile phones, tablets and connected watches, but can also be seen in other devices such as laptop computers, kiosks, automated teller machine (ATM) whiteboards, or other touchpad devices used for presentation and demonstration purposes.

The main purpose of this document is to provide a reliable, harmonized and easy-to-use interface for all on-screen keyboards with a direct touch interface across the various devices that might be using it, especially mobile and connected devices. It considers a wide range of user needs such as changing keyboard layouts for multilingual users, customization, responding to accessibility, or adapting the available keys depending on the context of use, to allow faster typing.

The ISO/IEC 22121 series specifies the requirements and recommendations for all types of virtual keyboards. This document specifies the requirements and provides further recommendations for on-screen keyboards with direct touch interface. This document is harmonized with ISO/IEC 24757, which describes any type of keyboard.

Information technology — Virtual keyboards user interfaces —

Part 2: On-screen keyboards with direct touch interface

1 Scope

This document specifies the design and specification of on-screen keyboards (keyboards that are displayed on a screen) with direct touch interface, including those with some audio feedback.

This document specifies keyboard layouts designed for on-screen keyboards with direct touch interface and ways for interaction with them.

It is not applicable to virtual keyboards that are not displayed on a screen, and on-screen keyboards that do not provide a direct touchscreen interface such as on-screen keyboards relying on an accessory unit like a trackpad or a remote control for interactions with the user.

It is not applicable to physical keyboards that use real or adaptable keys, which can be customized to user needs, for example, with LCD display.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9995-1:2009, *Information technology — Keyboard layouts for text and office systems — Part 1: General principles governing keyboard layouts*

ISO/IEC 9995-7, *Information technology — Keyboard layouts for text and office systems — Part 7: Symbols used to represent functions*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
on-screen keyboard
virtual keyboard (3.3) displayed on any type of screen

Note 1 to entry: On-screen keyboards are one specific type of virtual keyboards, probably the most common, that use a screen to display a visual keyboard.

Note 2 to entry: This type of virtual keyboard can be used on personal computer's screens, on feature phones and tablets, mobile phones and tablets, TVs, kiosks, whiteboards.

3.2
physical keyboard
mechanical or electronic input device using an arrangement of buttons or keys

Note 1 to entry: Some physical keyboards are adaptable (for example, using LCD screens instead of keys with printed symbols and characters).

3.3
virtual keyboard
software alternative to a *physical keyboard* (3.2)

3.4
associated character
alphabetic character derived from another alphabetic character

Note 1 to entry: Characters can be associated because a diacritic sign is added to it (for example, Ê is associated to letter E) or because of its close relation to it.

Note 2 to entry: For most languages, using associated characters is essential to write properly.

3.7
qwerty-like on-screen keyboard
virtual keyboard layout used for typing in Latin-based languages, with a layout of alphabetical characters similar to the physical keyboard layout from which it is derived (qwerty, qwertz, azerty…)

3.8
prediction
software-generated set of characters, i.e. word, phrase or text, based on user typing that can be selected as next input for faster typing

3.9
group
logical state of a keyboard providing access to a collection of *graphic characters* (3.13) or elements of graphic characters

Note 1 to entry: A group gives access to one collection of characters. Typically, when more than one language is used, multiple groups are required.

Note 2 to entry: Usually these graphic characters or elements of graphic characters logically belong together and can be arranged on several levels within a group.

Note 3 to entry: The input of certain graphic characters, such as accented letters, may require access to more than one group.

Note 4 to entry: Subsets of a group are called levels.

[SOURCE: ISO/IEC 9995-1:2009, 4.9]

3.10
level
logical state of a keyboard providing access to a subset of a collection of *graphic characters* (3.13) or elements of graphic characters in a *group* (3.9)

Note 1 to entry: In certain cases, the level selected may also affect function keys.

Note 2 to entry: With on-screen keyboards, it is usual that only one level be shown per panel at a time.

[SOURCE: ISO/IEC 9995-1:2009, 4.11]

3.11
space key
key associated with character U+0020 SPACE

[SOURCE: ISO/IEC 9995-9:2016, 3.18]

3.12
enter key
key associated with an enter or return function

[SOURCE: ISO/IEC 9995-9:2016, 3.9]

3.13
graphic character
character, other than a control function, that has a visual representation normally handwritten, printed or displayed

Note 1 to entry: Graphic characters with no visual representation can still be used, as per ISO/IEC 9995-7.

[SOURCE: ISO/IEC 9995-1:2009, 4.1, Note 1 to entry added.]

3.14
graphic symbol
visual representation of a *graphic character* (3.13), a control function, or a combination of one or more graphic characters and/or control functions

[SOURCE: ISO/IEC 9995-1:2009, 4.14]

3.15
symbol
any *graphic symbol* (3.14) which is none of a letter, a digit or a punctuation mark

[SOURCE: ISO/IEC 9995-9:2016, 3.24]

3.16
level 2 select
function that, if activated, will change the keyboard state to produce characters from level 2

Note 1 to entry: Level 2 is particularly associated to case in bicameral scripts (for example, scripts which use upper and lower case). Other characters are often displayed at the same time in level 2 when space allows it in the same panel.

Note 2 to entry: By default, level 2 select is activated only for the next keystroke.

Note 3 to entry: Level 2 select may be locked similarly to the capital state lock function.

[SOURCE: ISO/IEC 9995-1:2009, 4.15, modified — Notes 2 and 3 to entry added.]

3.17
group select
function that, if activated, will change the keyboard state to produce characters from a different group

[SOURCE: ISO/IEC 9995-1:2009, 4.13]

3.18
capitals lock state
state that, if activated, will result in the generation of the capital form of all *graphic characters* (3.13) on the keyboard for which such a form exists

[SOURCE: ISO/IEC 9995-1:2009, 4.7]

3.19
toggle key
on-screen keyboard key that provides a choice of two states

Note 1 to entry: Toggle keys can be used to access a collection of graphic characters.

Note 2 to entry: Toggle keys can provide access to menus for item selection.

Note 3 to entry: Different symbols can be used to display the toggle key status.

3.20
toggle key status
state of the *toggle key* (3.19) activated by the user

3.21
tap
single consecutive touch and release actions on a touchscreen device, typically it finishes shorter than 500 ms

Note 1 to entry: The touch action can be performed by any part of the human body (usually, the fingers), a pen, stylus, or any other stylus shaped object.

3.22
long tap
single consecutive touch, hold and release actions on a touchscreen device, typically it lasts longer than 500 ms

3.23
layout selection key
on-screen keyboard key used for switching among various on-screen *keyboard layouts* (3.24)

3.24
keyboard layout
physical, visual or functional arrangement of the keys on a keyboard

Note 1 to entry: Contrary to physical keyboards, on-screen keyboards do not rely on mechanical keys and printed/engraved labels, therefore, their layout can be changed conveniently by the user with the device's user interface.

Note 2 to entry: Some physical keyboards provide ways to change the visual arrangement of keys (for example, physical keyboards with LCD/LED displayed keys).

Note 3 to entry: An on-screen keyboard layout may give access to one or multiple groups of characters.

Note 4 to entry: Subsets of an on-screen keyboard layout are called groups.

Note 5 to entry: Keyboard layouts could be defined by national, regional or local standards.

4 Conformance

4.1 Conformance with this document

An on-screen keyboard with direct touch interface reaches conformance with this document if it meets the applicable requirements of Clauses 5 to 13.

NOTE Depending on the rendering of the on-screen keyboard, some requirements might not apply.

4.2 Claims of conformance

The on-screen keyboards used in this system conform to ISO/IEC 22121-2.

If the on-screen keyboard includes layout mappings derived from physical keyboard standardized layouts as defined in Clause 6, a reference to the original physical keyboard layout standard can be included in the declaration of conformance.

EXAMPLE The on-screen keyboards used in this system conform to ISO/IEC 22121-2 and provides an on-screen keyboard layout derived from NF Z 71-300 physical keyboard layout.

5 General requirements for on-screen keyboards with direct touch interface

5.1 Character availability

a) If the national or local standards exists for each available language in the system, the on-screen keyboard with direct touch interface shall provide the user the capacity to create all characters (as described in ISO/IEC 10646) required in those standards.

b) When no national or local keyboard standard exists, the on-screen keyboard shall provide the set of characters most commonly used in the country's software and devices, without limiting the set, for using this language.

c) Specific on-screen keyboards made for augmentive and assistive communication (AAC) can use different sets of characters and symbols to answer specific accessibility needs, as shown in Figure 1.

EXAMPLE Figure 1 illustrates an on-screen keyboard made for symbol communication. On this on-screen keyboard, there are 20 keys; each of them is composed of a graphical symbol and captioned text. The "describing" key, composed of a speech balloon with eyes symbol is activated. There are other keys around such as "food" (plate symbol), "clothes" (shirts symbol), "colours" (rainbow symbol) or "transport" (truck symbol).

Figure 1 — Example of an AAC on-screen keyboard used for symbol communication

5.2 Single finger/stylus and multiple finger text input

There are four functionalities currently detectable by touch panels:

— tap and double tap;

Additionally, there are several possibilities for the number of detection points at the same time on the touchpad:

— single point;

— two points;

— over three points.

a) For accessibility reasons, it shall be possible to operate all text input and related functionalities of an on-screen keyboard with a single point of interaction and using only tap or double taps.

EXAMPLE 1 When only one finger can be used.

EXAMPLE 2 When a stylus is used.

NOTE ISO/IEC 24786 defines a number of keyboard accessibility operations to operate with a single point of interaction.

b) On-screen keyboards may provide additional long tap, press, press and move, or multiple point interaction text input functionality for increased ergonomics.

EXAMPLE 3 When using on-screen keyboard layouts on a touchscreen device, it is possible to access associated characters using either a single tap or a long tap, as described in 8.2.2, if available.

EXAMPLE 4 When using bi-cameral language scripts on-screen keyboard layouts on an touchscreen device, it is possible to lock the capitals (similarly to the "caps lock" key and capitals lock state on physical keyboards) while still touching and holding the level 2 selection toggle key, using multipoint input detection, and type as many capital letters as required, as described in 7.2.1 d).

c) For accessibility reasons, when the touchpad device can detect advanced features such as long tap, press, press and move, or multiple point interaction, the user should be able to activate or deactivate a specific accessible input mode from the device's settings that fully complies with 5.2 a).

5.3 Adjustment

5.3.1 Long tap duration

For accessibility reasons, the long tap duration should be customizable from the device's on-screen keyboard settings, in order to meet the user's needs.

5.3.2 Double tap duration

For accessibility reasons, the double tap duration should be customizable from the device's on-screen keyboard settings, in order to meet the user's needs.

5.3.3 Touchpad pressure

a) For accessibility reasons, the device should provide ways to adjust the pressure used for single tap on the on-screen keyboard.

b) The device may provide additional ways to adjust the pressure used for some specific advanced features such as long tap, press, press and move, or multiple point interaction.

6 Mapping of keyboard layout standards

6.1 General

Due to their non-physical nature, on-screen keyboards cannot behave like physical keyboards and cannot have the exact same set of functionalities. One of the major issues is the limitation of available character keys, which can be due, for example, to display space constraints on smaller devices like watches.

In some cases, mapping an existing keyboard layout standard will be a prowess due to the very small size of the handheld device for which it is designed. More than one toggle key is then necessary to achieve this in different panels or layers.

