BS ISO/IEC 30113-11:2017

BSI Standards Publication

Information technology — Gesture-based interfaces across devices and methods

Part 11: Single-point gestures for common system actions

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ICT/-/6, ICT Accessibility.

A list of organizations represented on this committee can be obtained on request to its secretary.

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© The British Standards Institution 2017
Published by BSI Standards Limited 2017

ISBN 978 0 580 82467 8

ICS 35.240.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2017.

Amendments/corrigenda issued since publication

Date	Text affected

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INTERNATIONAL STANDARD

ISO/IEC 30113-11

First edition
2017-08

Information technology — Gesture-based interfaces across devices and methods —

Part 11: Single-point gestures for common system actions

Technologies de l'information — Interfaces gestuelles entre dispositifs et méthodes —

Partie 11: Gestes à point unique pour actions courantes du système

Reference number
ISO/IEC 30113-11:2017(E)

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 General ... **2**
5 Types of gestures ... **2**
5.1 Mediated gesture ... 2
5.2 Direct touch gesture ... 2
5.3 Non-contact gesture ... 3
5.4 Descriptions of gestures ... 3
6 Gesture adaptation ... **4**
7 Movement metaphor ... **4**
7.1 General ... 4
7.2 Consideration of the movement metaphor ... 6
8 Descriptions of the single-point gestures ... **6**
8.1 General ... 6
8.2 Directional gestures ... 7
8.2.1 General ... 7
8.2.2 “Left” gesture ... 8
8.2.3 “Right” gesture ... 10
8.2.4 “Up” gesture ... 11
8.2.5 “Down” gesture ... 13
8.2.6 “Forward” gesture ... 14
8.2.7 “Backward” gesture ... 16
8.2.8 “Clockwise rotation” gesture ... 17
8.2.9 “Counter-clockwise rotation” gesture ... 18
8.3 Command gestures ... 20
8.3.1 General ... 20
8.3.2 “Tap” gesture ... 21
8.3.3 “Displace” gesture ... 22
8.3.4 “Double-tap” gesture ... 23
8.3.5 “Tap and hold” gesture ... 24
8.3.6 “Horizontal wave” gesture ... 25
8.3.7 “Vertical wave” gesture ... 26
9 System level functions ... **28**
10 Common functions across applications ... **29**

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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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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

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Introduction

A single-point gesture is generated by a user with a pointer [which includes an input device (e.g. a mouse, a stylus, etc.) or a body part (e.g. a fingertip, a hand, etc.)] providing gesture actions using a single point of interest (POI). The gesture can be recognized and interpreted as a command which is understood by platforms, systems or applications running information and communications technology (ICT) systems. If the user feels that the gesture is natural and it is convenient and comfortable to generate, he/she can easily utilize the gesture for the applications on the ICT systems without spending an excessive amount of time learning and practising how to use the gesture.

A single-point gesture is used in several commercially-available ICT systems including personal computers, smart televisions, smart phones and video game consoles. There is a need for an International Standard to define the single-point gesture so that a user does not get confused if a gesture is associated with a different command for another application. Potential variety and inconsistency among single-point gestures might cause a serious usability problem in using applications on ICT systems.

This document presents descriptions of single-point gestures and their corresponding gesture commands for system level functions and common functions across applications on ICT systems. The system level functions include functions for selecting, initiating, terminating, resuming and restarting applications which are handled by operating systems or platforms. The common functions across applications are also identified. These functions include navigating menus, opening and closing objects, “help”, “undo”, “redo”, and so on.

The single-point gestures will harmonize with other gestures of multiple POIs. It is expected that users can execute applications more easily and without confusion by utilizing the single-point gestures. The gestures are to be performed by the users regardless of a specific recognition technique, a certain interaction method or a device. The focus of this document is on the users and their cognitive aspects.

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Information technology — Gesture-based interfaces across devices and methods —

Part 11: Single-point gestures for common system actions

1 Scope

This document defines single-point gestures for common system actions used in information and communication technology (ICT) systems. It specifies movements for clear and classified gestures recognized by the systems and applications. The single-point gestures are performed using an input device (e.g. a mouse, a stylus, etc.) or a body part (e.g. a fingertip, a hand, etc.). These single-point gestures are intended to operate in a consistent manner regardless of the system, platform, application or device.

NOTE ICT systems include, but are not limited to, digital televisions, set-top boxes, video game consoles, communication devices, Internet devices, entertainment devices and personal computers.

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 30113-1:2015, *Information technology — User interface — Gesture-based interfaces across devices and methods — Part 1: Framework*

3 Terms and definitions

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

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

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

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

3.1
point of interest
POI
specific point location that a user utilizes to formulate a gesture

3.2
single-point gesture
sequence of actions of moving a *POI* (3.1) by a user which are clearly recognized by the system

3.3
multi-point gesture
sequence of actions of moving multiple *POIs* (3.1) by a user which are clearly recognized by the system

EXAMPLE A gesture with two hands or a gesture with multiple fingers.

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4 General

A user interface conforming to this document shall be able to recognize single-point gestures within a pre-defined space where a user performs the gestures. Once a single-point gesture is recognized by a user interface, its corresponding gesture command shall be invoked and executed.

The gestures in this document are discussed from a user's viewpoint. The gestures are defined regardless of recognition techniques, interaction methods, input devices and so on. This document emphasizes and focuses on users who perform the gestures.

The accessibility of gestures is important to meet the needs of people with disabilities and elderly people.

EXAMPLE Gestural interactions can make use of eye-tracking and/or recognition of facial expressions for some physically disabled users.

5 Types of gestures

5.1 Mediated gesture

Mediated gestures include a sequence of movements with a single-point input device which is physically connected to and provides input data to a system such as a mouse, a joystick, a track ball, etc. In order to distinguish a gesture input from other movements of the input device, such as a mouse pointing, it is important for a user to know how to activate the gesture input.

EXAMPLE The basic actions of the mediated gestures using a mouse include "clicking", "double-clicking", "dragging", and so on. In case of a mouse with two buttons, its right button can be used for activating a gesture. Then, the gesture enters the initial state.

In order to minimize errors of misinterpreting a gesture input, a system ignores any unintentional movement of a pointing device in generating gestures. For a mediated gesture using a mouse, the minimum movement of the pointer of the mouse shall be over a specific number of pixels (e.g. 30 pixels) along horizontal, vertical or diagonal directions.

After activating a gesture input, the system enters into intermediate states. A visual trail (which presents pointer's movements and guides) should be displayed on an output device, such as a screen, in order to provide a feedback and/or a feed-forward to a user. This can improve a usability of the system or the platform. However, in case of a gesture command that contains continuous manipulation of a POI (e.g. in case of the "Displace" gesture), no visual trail should be displayed because it may interfere with a pointer or a cursor.

5.2 Direct touch gesture

A direct touch gesture is a sequence of movements (e.g. pinching, swiping, etc.) of a user with a body part (e.g. a finger) or a physical object (e.g. a stylus) on an input device (e.g. a touch pad or a touch screen). As soon as a user touches the pad or the screen, an initial state of a gesture starts. Then, its intermediate states begin as the movements of the touch (e.g. swiping, pressing, holding, etc.) proceed.

There are several elementary actions of the direct touch gestures that are important to a range of the gestures.

— "Tapping": The tapping action is performed by tapping a pad or a screen with a body part or a physical object manipulated by a user. It is a gesture that can be defined as a brief contact between the user and the aimed device. It starts with a contact and is rapidly followed by a lack of contact. The input device might sense the pressure from the body part or the physical object. This action can be used as a selector of an object. An action of "double-tapping" is performed as consecutive actions of tapping. The double-tapping can be used as an activator or an initiator of an application.

— "Holding": The holding action is started with a direct contact (i.e. "Tapping") to a pad or a screen by a user. Then, the position and the area of the tapping body part or the physical object do not change

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over the specific time period. The difference between the holding action and the tapping action is the time of touching the pad or the screen.

— "Pressing": The pressing action is performed by a combination of the tapping action and the holding action on a pad or a screen with a body part or a physical object by a user. The input device might sense the pressure from the touch or the changes of the touching area involved in the touch.

— "Swiping": The swiping actions are similar to the four-directional gestures of Table 1. The major difference is a speed of performing the gestures. The swiping action requires a performance with a speed. The specific speed of the swiping action shall be defined in its corresponding input device.

5.3 Non-contact gesture

A non-contact gesture involves a sequence of movements of a body part or a physical object (which is physically not connected or wirelessly connected to a system) by a user to invoke a command. It is assumed that the gesture does not touch an input screen or an input surface of the system. The non-contact gesture is generally performed in a two-dimensional or three-dimensional (2D or 3D) space where the gesture should be clearly recognized by sensors or cameras of the system.

5.4 Descriptions of gestures

The representations of the gestures in this document shall conform to the following rules.

— If a position of a body part is involved, the gesture representation involves its starting position and ending position. A user is expected to make a clear distinction between a starting point and an ending point of each non-contact gesture for the clear recognition of the gesture.

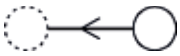
— This document defines the starting point of the gesture as an initial state and the ending point of the gesture as a final state.

— The starting point is visually represented by a single circle with a solid line (which represents a POI as shown in Figure 1), while the ending point is represented by a circle with a dotted line as shown in Figure 2.

Figure 1 — Single circle represents a starting point of a gesture

Figure 2 — Ending point of a gesture represented by a circle with a dotted line

— An arrow is used for representing a single stroke with a specific direction. The following example presents a gesture of moving a POI from its current position (the starting point) to its left side until it arrives the ending point.



EXAMPLE 1 The "Left" gesture (G11-1 in Clause 8).

— A number of arrows represent a speed of performing gestures. The speed is expressed by adding one more arrow as shown in Figure 3. The two arrows express a "faster" stroke of the "Left" gesture. It describes a "swiping" gesture of the direct touch gesture, which is a variation of the "Left" gesture;

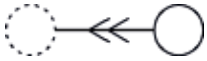


Figure 3 — Variation of the "Left" gesture, i.e. "Left swiping"

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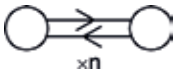
— A combination of lines and arrows are used for expressing repetitive strokes of waving. If the number of repetitive strokes is predefined to be recognized, it should be specified using “xn”, where the number, “n”, denotes an unspecified number of the repetitions, as shown below.



EXAMPLE 2 The “Horizontal wave” gesture (G11-13 in Clause 8).

— An action of holding a POI is illustrated as the starting point icon and an icon of an hourglass. The hourglass icon symbolizes a certain period of time for holding.

EXAMPLE 3 The “Tap and hold” gesture (G11-12 in Clause 8).

6 Gesture adaptation

A 3D non-contact gesture can be cognitively complex to perform, because it requires several dimensions for a user and a device to combine. Therefore, he/she often executes a 3D non-contact gesture in a two-dimensional (2D) space.

EXAMPLE When a user has to produce a 3D non-contact gesture of drawing a sphere, he/she usually produces a circle or a set of circles on a virtual 2D temporary plane.

A user naturally optimizes his/her gestures from a kinematic point of view. This is another reason why users express their 3D non-contact gestures using their body parts in a 2D plane; it costs less in terms of energy. Muscles, paths of blood flow, bone articulators and so on require optimization in terms of kinematics.

A gesture-based interface should be able to recognize and interpret the simplified and/or optimized gestures. The gesture-based interface should be adapted in order to support a user’s performances of more convenient, comfortable and natural gestures.

Experts or advanced users tend to optimize their gesture performances. They tend to move less and to execute shorter strokes. Therefore, it is important for an interface to offer and understand predefined gestures for the expert or advanced users.

Users with disabilities or users involved in simultaneous multiple tasks can be limited as they are performing gestures: some users might be able to move only a single hand, some users might be able to move their hand only but not their fingers, some users might be able to move their eyes only, and so on. Such limitations might be due to a physiological or cognitive disability or to another parallel task. An interface shall offer a way of adapting gestures (such as “eye-tracking”, “recognition of facial expressions”, and so on) so that it enables equivalent interaction opportunities as for non-disabled users.

Gestures may deliver different meanings depending on cultural and linguistic background of their users. A gesture-based interface should be able to offer a way of adapting gestures based on personal preferences, ability and cultural and linguistic adaptability.

7 Movement metaphor

7.1 General

A user views digital content such as a document or an image through a viewing window of a screen on an ICT system. When the size of the viewing window is smaller than the size of the content, either the window or the content should be moved. There are two metaphors for moving a POI for viewing the content:

— moving the viewing window over the content;

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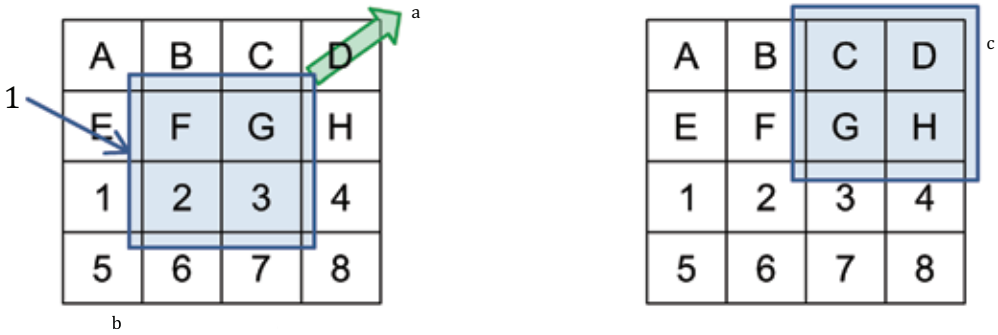
— moving the content with the fixed viewing window.

The first metaphor is “movement of a viewing window”, which allows the user to navigate the content by moving the viewing window.

As illustrated in Figure 4, the user displaces the viewing window at a specific position to view a part of the content by moving a POI. In Figure 4, the user views the parts of the content, “F”, “G”, “2”, and “3” in the viewing window. If the user moves the viewing window to a new position along the direction, the user will view the parts of the content, “C”, “D”, “G”, and “H”.



Key

1 viewing window

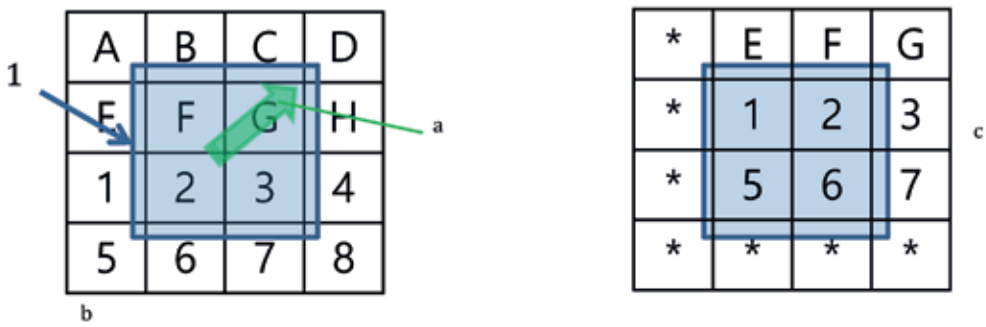
a Moving the viewing window by the “move” command from a user.

b Content to be viewed.

c Viewing window in a new position.

Figure 4 — Movement of a viewing window

The second metaphor is “movement of content”, which allows the user to navigate the content by moving a POI. Figure 5 illustrates moving the content by the user. If the user initially views “F”, “G”, “2”, and “3” through a viewing window, the user will view “1”, “2”, “5”, and “6” after moving a POI along the direction under the “movement of content” metaphor.



Key

1 viewing window

a Moving the content by the “move” command from a user.

b Content to be viewed.

c New content presented through the viewing window.

Figure 5 — Movement of content

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