SLOVENSKI STANDARD
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Ergonomija medsebojnega vpliva človek-sistem - 920. del: Navodilo za taktilne in haptične interakcije (ISO 9241-920:2009)

Ergonomics of human-system interaction - Part 920: Guidance on tactile and haptic interactions (ISO 9241-920:2009)

Ergonomie der Mensch-System-Interaktion - Teil 920: Anleitung zu taktilen und haptischen Interaktionen (ISO 9241-920:2009)

Ergonomie de l'interaction homme-système - Partie 920: Lignes directrices relatives aux interactions tactiles et haptiques (ISO 9241-920:2009)

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ISO 9241-920

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Ergonomics of human-system interaction —

Part 920: Guidance on tactile and haptic interactions

Ergonomie de l'interaction homme-système —

Partie 920: Lignes directrices relatives aux interactions tactiles et haptiques

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9241-920 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

ISO 9241 consists of the following parts, under the general title *Ergonomic requirements for office work with visual display terminals (VDTs)*:

— *Part 1: General introduction*

— *Part 2: Guidance on task requirements*

— *Part 4: Keyboard requirements*

— *Part 5: Workstation layout and postural requirements*

— *Part 6: Guidance on the work environment*

— *Part 9: Requirements for non-keyboard input devices*

— *Part 11: Guidance on usability*

— *Part 12: Presentation of information*

— *Part 13: User guidance*

— *Part 14: Menu dialogues*

— *Part 15: Command dialogues*

— *Part 16: Direct manipulation dialogues*

— *Part 17: Form filling dialogues*

ISO 9241 also consists of the following parts, under the general title *Ergonomics of human-system interaction*:

— *Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services*

— *Part 110: Dialogue principles*

— *Part 151: Guidance on World Wide Web user interfaces*

— *Part 171: Guidance on software accessibility*

— *Part 210: Human-centred design for interactive systems*

— *Part 300: Introduction to electronic visual display requirements*

— *Part 302: Terminology for electronic visual displays*

— *Part 303: Requirements for electronic visual displays*

— *Part 304: User performance test methods for electronic visual displays*

— *Part 305: Optical laboratory test methods for electronic visual displays*

— *Part 306: Field assessment methods for electronic visual displays*

— *Part 307: Analysis and compliance test methods for electronic visual displays*

— *Part 308: Surface-conduction electron-emitter displays (SED)* [Technical Report]

— *Part 309: Organic light-emitting diode (OLED) displays* [Technical Report]

— *Part 400: Principles and requirements for physical input devices*

— *Part 410: Design criteria for products for physical input devices*

— *Part 920: Guidance on tactile and haptic interactions*

The following parts are under preparation:

— *Part 100: Introduction to standards related to software ergonomics*

— *Part 129: Guidance on software individualization*

— *Part 420: Selection procedures for physical input devices*

— *Part 910: Framework for tactile and haptic interaction*

Forms-based dialogues and design guidance for interactive voice response (IVR) applications are to form the subjects of future parts 143 and 154.

Introduction

Tactile and haptic interactions are becoming increasingly important as candidate interaction modalities in computer systems such as special-purpose computing environments (e.g. simulation) and in assistive technologies. While considerable research exists, a lack of ergonomic standards in this area could result in systems being developed without sufficient concern for either ergonomics or interoperability, leading to serious ergonomic difficulties for users of multiple, incompatible or conflicting tactile/haptic devices/applications. This part of ISO 9241 provides ergonomics recommendations for tactile and haptic hardware and software interactions, including guidance related to the design and evaluation of hardware, software, and combinations of hardware and software interactions. The guidelines are not technology-dependent and will also be applicable to future technologies.

Ergonomics of human-system interaction —

Part 920:
Guidance on tactile and haptic interactions

1 Scope

This part of ISO 9241 gives recommendations for tactile and haptic hardware and software interactions. It provides guidance on the design and evaluation of hardware, software, and combinations of hardware and software interactions, including

— the design/use of tactile/haptic inputs, outputs, and/or combinations of inputs and outputs, with general guidance on their design/use as well as on designing/using combinations of tactile and haptic interactions for use in combination with other modalities or as the exclusive mode of interaction,

— the tactile/haptic encoding of information, including textual data, graphical data and controls,

— the design of tactile/haptic objects,

— the layout of tactile/haptic space, and

— interaction techniques.

It does not provide recommendations specific to Braille, but can apply to interactions that make use of Braille.

The recommendations given in this part of ISO 9241 are applicable to at least the controls of a virtual workspace, but they can also be applied to an entire virtual environment — consistent, in as far as possible, with the simulation requirements.

NOTE It is recognized that some interactive scenarios might be constrained by the limitation that a real workspace is to be modelled in a virtual environment. Objects can be in suboptimal positions or conditions for haptic interaction by virtue of the situation being modelled.

2 Applying ISO 9241-920

2.1 Recommendations

Individual recommendations given in Clauses 5 to 7 should be evaluated for their applicability. The applicable recommendations should be implemented unless there is evidence that to do so would cause deviation from the design objectives.

2.2 Evaluation of products

If a product is claimed to have met the applicable recommendations in this part of ISO 9241 then the procedures used to establish the product's requirements, and to evaluate the product, shall be specified. The level of detail of the specification is a matter of negotiation between the involved parties.

3 Tactile/haptic inputs, outputs, and/or combinations

3.1 General guidance on tactile/haptic inputs, outputs and/or combinations

3.1.1 Optimizing performance

The system should be optimized to take account of the following.

a) The accuracy of available devices, the accuracy of the user, and the required accuracy of the task.

b) The ability of a user to control the speed and the force involved in operations.

NOTE 1 High speed of user actions is inconsistent with accurate control of force, and vice versa.

c) Active exploration over passive exploration, when appropriate.

NOTE 2 This can increase kinaesthetic perception.

d) Multiple point-of-contact operation, when possible and appropriate.

NOTE 3 This can reduce errors and improve tactile perception.

EXAMPLE The use of two hands in reading Braille can improve efficiency.

e) The overall amount and distributed nature of cognitive and sensory task demands.

NOTE 4 Effectiveness of tactile and haptic inputs is affected by overall workload, conflict among multi-task demands, and/or overload or decrement of particular sensory information channels.

3.1.2 Providing accessible information on tactile/haptic elements

The system should provide accessible descriptions of all tactile/haptic user interface elements, whether those descriptions are automatically presented or not.

NOTE Information can be presented by text, sound labels, synthetic speech, sign language or as Braille text.

EXAMPLE Ability to determine file size or file location.

3.1.3 Providing contextual information

The system should provide a context to help the user to understand the meaning of the tactile/haptic perception and the environment or program.

NOTE 1 Contextual information that is helpful includes information about the purpose of the program, and information about possibilities and pitfalls in the environment.

NOTE 2 Contextual information can be in the form of a short text message, such as a caption under an image or model, provided as speech, sign language or Braille.

3.1.4 Using consistent labels

Labels of user interface elements that are presented in a tactile/haptic modality should

a) be consistent in size and distances from other tactile objects,

b) be located according to a consistent rule,

c) be uniformly oriented.

NOTE Labels that contain the same information or function need to be equal in form, symbol usage and/or text.

