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Ergonomics of human-system interaction —

Part 380: Survey result of HMD (Head-Mounted Displays) characteristics related to human-system interaction

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Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Head-mounted displays (HMDs) **2**
5 Categories of HMDs **3**
5.1 General 3
5.2 Categorized by virtual image 5
5.2.1 VR type 5
5.2.2 AR type 5
5.2.3 MR type 5
5.3 Categorized by virtual image formation 6
5.3.1 Imaging display and optics 6
5.3.2 Scanning type 6
5.3.3 Light field type 6
5.3.4 Holographic display with waveguide type 7
5.4 Categorized by ocularity 8
5.4.1 Binocular 8
5.4.2 Biocular 9
5.4.3 Monocular 9
5.5 Categorized by physical configuration 9
5.5.1 Eyeglasses type 9
5.5.2 Placed on eyeglasses 9
5.5.3 Frame plus optical device 10
5.5.4 Goggles 10
5.5.5 Smart phone with box 10
5.5.6 Helmet mounted 11
5.6 Categorized by system configuration 11
5.6.1 Wireless HMD (standalone) 11
5.6.2 Smart phone with special optics 12
5.6.3 Wired HMD 12
5.7 Categorized by physical input devices for HMD system 12
5.7.1 HMD System without external physical input devices 12
5.7.2 HMD System with external physical input devices 12
6 HMD human-system interaction characteristics **13**
6.1 Optical characteristics 13
6.1.1 General 13
6.1.2 Distance between eyes 18
6.1.3 Distortion and aberration 18
6.1.4 Inter-Ocular optical properties 21
6.1.5 For AR/MR 26
6.1.6 For AR 29
6.1.7 For AR, video see-through properties 30
6.1.8 For light field display 30
6.2 HMD system-related characteristics 31
6.2.1 Time delay of HMD system (latency) 31
6.2.2 Degree of freedom 32
6.3 Other characteristics of HMD 33
6.3.1 Physical properties 33
6.3.2 Alignment 34
6.4 Physical conditions of a viewer 34

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6.4.1 Age 34
6.4.2 Habituation 35
6.4.3 Preference 35
6.4.4 Duration 35
6.4.5 Posture of a user 35
6.5 Presence and immersion 35
7 Visual induced motion sickness (VIMS) 35
7.1 General 35
7.2 SSQ 35
7.3 VIMS related factors 36
8 Consideration 36
Annex A (informative) **Visual Fatigue and Discomfort 37**
Bibliography 39

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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.

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 ISO documents 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 of 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 www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO 9241 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.

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Introduction

The evolution of electronic devices has led to the growing popularity of head-mounted displays (HMDs) for direct human–machine interaction. Although ISO 9241-303 and ISO 305 addressed HMDs as 'virtual displays', the information in these documents was limited to devices available at the time, and the evolution of HMDs requires new parameters to cover the interactions between the user and the HMD itself. To provide the latest information to suppliers, users, and anyone who interacts with HMDs, it is important to establish which HMD characteristics need to be considered.

Unlike a conventional display, a viewer wears an HMD to see the displayed images. In most cases, when images are shown on a conventional display, there is a certain distance between the viewer and display. However, as stated, a viewer of an HMD wears it, usually on their head. Obviously, such viewing conditions affect the viewer in certain ways, by not only the optical characteristics (which are the main concerns for conventional displays) but also other physical characteristics such as weight. Therefore, discussing the ergonomic considerations of HMDs requires a systematic approach by considering several aspects simultaneously, which is the aim of this document.

NOTE The International Electrotechnical Commission (IEC) also works on the standardization of HMDs (the IEC calls them 'eyewear displays'). At the time of publication, the following IEC standards are available and are being developed:

IEC TR 63145-1-1: 2018: *Eyewear display - Part 1-1: Generic introduction*

IEC 63145-20-10:2019: *Eyewear display - Part 20-10: Fundamental measurement methods - Optical properties*

IEC 63145-20-20:2019: *Eyewear display - Part 20-20: Fundamental measurement methods - Image quality*

IEC 63145-22-10:2020: *Eyewear display - Part 22-10: Specific measurement methods for AR type - Optical properties*

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Ergonomics of human-system interaction —

Part 380:
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1 Scope

This document provides information based on a study of the characteristics of head-mounted displays (HMDs) regarding the ergonomics of human–system interaction. Although this document covers the broad range of ergonomics issues that arise, it specifically provides more-detailed information about the visual aspects of the interaction, and it provides information that could form the basis for future possible standards related to HMDs.

NOTE It is preferable to take systematic approach to consider characteristics of HMD, since HMD affects a viewer not only by visual aspects, but also by some other physical aspects.

2 Normative references

There are no normative references in this document.

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
head-mounted display
HMD
electronic device that shows information on one or more displays attached to the head of a human

3.2
virtual reality
VR
artificial environment presented by a computer

Note 1 to entry: See Figure 1.

Note 2 to entry: Including telepresence and interaction with and reaction from the virtual environment.

[SOURCE: ISO/IEC TR 18121:2015, 3.6]

3.3
mixed reality
MR
physical and digital (virtual) objects co-exist and interact in real time

Note 1 to entry: See Figure 1.

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