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TECHNICAL REPORT

3D displays -
Part 1-3: Generic - Human depth perception and the determination of the position of 3D object on the non-physical screen

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CONTENTS

FOREWORD 2
1 Scope 4
2 Normative references 4
3 Terms, definitions and abbreviated terms 4
3.1 Terms and definitions 4
3.2 Abbreviated terms 4
4 Perception of the depth by human 5
4.1 Horopter 5
4.2 Panum's fusional area 6
4.3 Stereo acuity 6
4.4 Panum's fusional area and stereo acuity represented in length 7
5 Focal power and accommodation of the human eye 8
5.1 Accommodation 8
5.2 Depth of field and depth of focus 8
5.3 Accommodation-vergence mismatch 11
6 Determination of the position of the 3D object on the non-physical screen 11
6.1 General 11
6.2 Parallax method 12
6.3 Focal method 14
6.4 Cylindrical lens 15
6.5 Focal method – Angular dependence 16
7 Summary 18
Bibliography 19

Figure 1 – Horopter 5
Figure 2 – Horopter and Panum's fusional area (noted as the grey area) 6
Figure 3 – The relation of IPD, distance and angle α and β 7
Figure 4 – Depth of field and depth of focus 9
Figure 5 – Effect of aperture size on depth of field 10
Figure 6 – Accommodation-vergence mismatch where crossing point is inside the DOF 11
Figure 7 – Parallax methods with and without LMD rotation 13
Figure 8 – Example of experiment by the methods of IEC 62629-62-11 [8] 13
Figure 9 – Principle of the focal method 14
Figure 10 – Examples of the measured result of holographic 3D by the focal method 14
Figure 11 – Refraction by non spherical lenses 15
Figure 12 – Example of the light trajectories measurement through the pinhole plate 17
Figure 13 – Light trajectories with azimuthal dependence 18

Table 1 – Panum's area at the various viewing distances D_A 8
Table 2 – Distinguishable depth ΔD and B_D at stereo acuity of 40 arc s 8
Table 3 – Example of depth of field at the various viewing distances 10
Table 4 – Lists of terms related to the distances in IEC documents 12

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3D displays - Part 1-3: Generic - Human depth perception and the determination of the position of 3D object on the non-physical screen

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The text of this Technical Report is based on the following documents:

Draft	Report on voting
110/1811/DTR	110/1818/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

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A list of all parts in the IEC 62629 series, published under the general title *3D displays*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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1 Scope

This part of IEC 62629, which is Technical Report, is intended to gather technical information on human depth perception and the determination of 3D object positions on a non-physical screen.

Clause 4 and Clause 5 describe the human depth perception and its threshold. This information will be helpful in designing 3D displays of the non-physical screen type such as the possible depth difference of 3D objects. In the measurement of the display, understanding the response and limitation of the user is useful. Clause 4 and 5 provide such perception information in determining the distance of 3D object on the non-physical screen.

It is not the intention of this document to set the requirement of the measurement system in determining the position of 3D object on the non-physical screen.

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.

IEC 62629-1-2, *3D display devices - Part 1-2: Generic - Terminology and letter symbols*

3 Terms, definitions and abbreviated terms

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3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62629-1-2 apply.

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

– IEC Electropedia: available at https://www.electropedia.org/
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3.2 Abbreviated terms

2D	two dimensional
CMOS	complementary metal–oxide–semiconductor
DOF	depth of field
IPD	interpupillary distance
LMD	light measuring device

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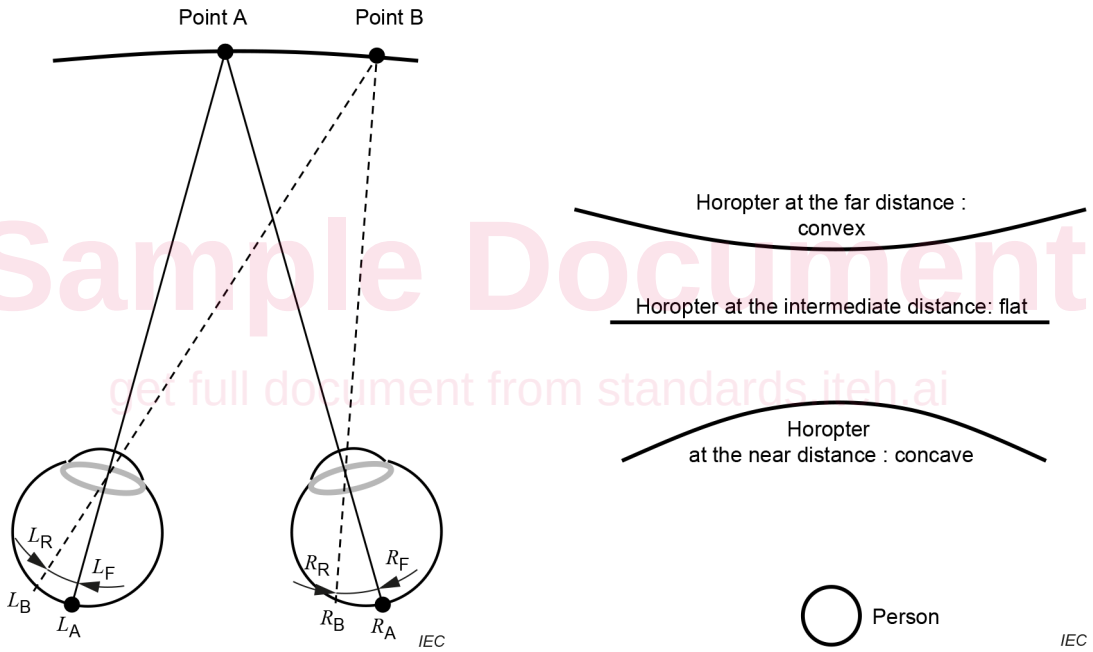
4 Perception of the depth by human

4.1 Horopter

Figure 1 a) illustrates an example where the image of points A and B is formed on the different positions of the retina as L_A and L_B for the left eye and R_A and R_B for the right eye. The fovea is the central part of the retina, forming the site of the most distinct vision [1][1]. When L_A and R_A are located on the fovea of each eye (L_F and R_F), the direction of the eye toward the point A is called the gazing direction, to distinguishing this direction from the other viewing direction. L_R illustrates the distance from L_F and L_B. R_R illustrates the distance from R_F and R_B. When the sizes of L_R and R_R are the same, L_B and R_B are called corresponding retinal points.

A horopter is the set of all points in a visual space that will stimulate pairs of corresponding retinal points of the left and right eyes [1]. A person perceives the points on the horopter to be at the same distances. The shapes of the experimentally measured horizontal horopter change from the concave to the planar to the convex as the distance increases, as illustrated in Figure 1 [1].



a) Fovea, horopter and corresponding retinal points

b) Shapes of the experimentally measured horizontal horopter versus the viewing distance

Figure 1 – Horopter

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[1] Numbers in square brackets refer to the Bibliography.

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