

First edition
2020-04

Information technology — Computer graphics, image processing and environmental representation — Sensor representation in mixed and augmented reality



Reference number
ISO/IEC 18038:2020(E)

© ISO/IEC 2020



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of "ISO/IEC 18038:2020". Click here to purchase the full version from the ANSI store.

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Concepts	4
4.1 Overview.....	4
4.2 Scope of physical sensor representation.....	5
4.3 Physical sensor types.....	6
4.3.1 General.....	6
4.3.2 Camera sensor.....	7
4.3.3 Chemical sensor.....	7
4.3.4 Electric sensor.....	8
4.3.5 Environment sensor.....	8
4.3.6 Flow sensor.....	8
4.3.7 Force sensor.....	9
4.3.8 Light sensor.....	9
4.3.9 Movement sensor.....	10
4.3.10 Navigation sensor.....	10
4.3.11 Particle sensor.....	11
4.3.12 Position sensor.....	11
4.3.13 Pressure sensor.....	12
4.3.14 Proximity sensor.....	12
4.3.15 Sound sensor.....	13
4.3.16 Temperature sensor.....	13
4.3.17 Other sensors.....	14
4.4 Sensor representation.....	14
4.4.1 Overview.....	14
4.4.2 Precise location and orientation of a physical sensor.....	16
4.4.3 Sensor properties and interface.....	19
4.4.4 Sensor representation data model.....	19
5 Sensor 3D scene graph	19
5.1 Definition of a sensor 3D scene graph.....	19
5.2 Physical properties and interfaces with real worlds.....	21
5.2.1 General.....	21
5.2.2 Physical properties of a physical sensor.....	21
5.2.3 Physical interfaces with real worlds of a physical sensor.....	22
5.2.4 A data structure for the physical properties and interfaces for a physical sensor.....	23
6 System architecture for physical sensor representation	25
6.1 System architecture for physical sensors.....	25
6.2 System framework.....	26
6.2.1 General.....	26
6.2.2 3D MAR world representation.....	27
6.2.3 GNSS synchronized 3D virtual worlds.....	27
6.2.4 Sensor devices and their properties.....	28
6.2.5 Interfaces with 3D sensor objects.....	28
6.2.6 Interfaces with physical sensor devices.....	28
7 XML definition of physical sensor representation	28
7.1 Structure of mixed and augmented reality scene.....	28
7.1.1 MARScene.....	28
7.1.2 MARObject.....	28

This is a preview of "ISO/IEC 18038:2020". Click here to purchase the full version from the ANSI store.

7.1.3	3D object.....	28
7.1.4	Shape.....	28
7.1.5	Physical sensor.....	28
7.1.6	Sensor type.....	28
7.1.7	Physical properties.....	29
7.1.8	Physical interface.....	29
7.2	XML schema definition.....	29
7.2.1	MARSceneType.....	29
7.2.2	GeoPositionType.....	30
7.2.3	LatitudeType and LongitudeType.....	30
7.2.4	GeoBoundingBoxType.....	31
7.2.5	LengthType.....	32
7.2.6	OrientationType.....	33
7.2.7	MARObjectType.....	35
7.2.8	ThreeDObjectType.....	35
7.2.9	ShapeType.....	36
7.2.10	AbstractSensorType.....	37
7.2.11	PhysicalPropertiesType.....	40
7.2.12	UUIDType, EventType and ControlType.....	40
7.2.13	PhysicalInterfaceType.....	41
7.2.14	IPAddressType and PortType.....	43
8	Conformance.....	44
8.1	Conformance criteria.....	44
8.2	Conformance area.....	45
Annex A (informative) Examples of physical sensor types and parameters.....		46
Annex B (informative) Schema for sensor MAR representation.....		54
Annex C (informative) Example XML schema extension for physical sensor representation.....		55
Annex D (informative) Example of sensor MAR representation based on the sensor MAR schema.....		56
Annex E (informative) Implementation examples of sensor MAR representation.....		57
Bibliography.....		61

This is a preview of "ISO/IEC 18038:2020". Click here to purchase the full version from the ANSI store.

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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)

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics, image processing and environmental data representation*.

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

This document defines a representation model for physical sensors to be included in a 3D mixed-reality world. It defines 3D modelling, rendering, simulation, and interfaces for physical sensors. It defines a set of principles, concepts, and functionalities for physical sensors applicable to the complete range of 3D mixed reality standards. It includes the following content:

- terms and definition for sensor interfaces;
- requirements and scope;
- a representation model of physical sensors that can be included in a 3D scene;
- 3D modelling, rendering, and simulation of physical sensors in a 3D scene;
- representation of the attributes of physical sensors in a 3D scene;
- representation of I/O data streaming of physical sensors in a 3D scene;
- representation of the interfaces for controlling physical sensors in a 3D scene;
- functionalities and base components;
- relevant physical sensor properties;
- interfaces with virtual and real worlds;
- use cases.

The objectives of this document are as follows:

- provide a reference model for physical sensor-based 3D mixed-reality applications;
- manage and control physical sensors with their physical properties in 3D mixed reality environments;
- provide an exchangeable information model necessary for transferring and storing data between sensor-based mixed-reality applications;
- support user interfaces with 3D mixed-reality worlds;
- support physical sensor interfaces with 3D mixed-reality worlds.