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Part 31: Haptics coding

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Partie 31: Codage haptique

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

A list of all parts in the ISO/IEC 23090 series can be found on the ISO and IEC websites.

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Introduction

Haptics provide an additional layer of entertainment and sensory immersion to the user. Therefore, the user experience and enjoyment of media content, from a ISOBMFF files, broadcast channel, streaming games or mobile advertisements can be significantly enhanced by the judicious addition of haptics to the audio/video content. To that end, haptics has been proposed as a first-order media type, akin to audio and video, in ISOBMFF. Further, haptics has also been proposed as an addition to ISO/IEC 23009-1 (MPEG-DASH) to signal the presence of haptics in MP4 segments to DASH streaming clients. Lastly, the ISO/IEC 23090 (MPEG-I) use cases have been augmented with haptics

Haptics digital encoding is the storing of tactile data in a digital format. As with audio and video, digital encoding is of fundamental importance to allow digital haptic devices to function. Haptics encoding gained relevance with the increased market importance of wideband haptics in consumer peripherals such as smartphones with haptic engines and game consoles with haptic enabled controllers. The prior generation of haptics peripherals was based on less expressive haptic actuators usually based on state machine control processes.

In the field of haptics, the signal encoding usually takes one of two approaches:

— Quantized: This representation is generally made from measured data. The samples from the original phenomenon are stored at a specific acquisition frequency inside the file to represent this signal. One example of a quantized haptic signal is proposed through WAV files, originally developed for audio. WAV file formalism allows the capture of real-world data and the representation of complex wideband haptic feedback. This type of haptics encoding has the disadvantage of being difficult to modify once encoded due to the inability to access the primitives used to create the signal.

— Descriptive: This representation is used to encode haptic signals as a combination of functions to be synthesized. Examples of such vectorized formats include AHAP and IVS. These formats have the advantage of being created with a composition of primitives. They are easily modifiable at runtime by an application and by dedicated editing tools. Currently, these solutions support only vibrotactile perception, but can easily be extended for other forms of haptics such as kinaesthetic, temperature and textures. They also tend to be memory inefficient with increasing signal complexity and cannot encode non-periodic phenomena

This document describes the coded representation allowing to encode both descriptive and quantized data in a human readable JSON format (.hjif) used as an exchange format. This format can be compressed and packetized into a binary file format for distribution and streaming purposes (.hmpg).

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Information technology — Coded representation of immersive media —

Part 31: Haptics coding

1 Scope

This document specifies technology that supports the efficient transmission and rendering of haptic signals for the playback of immersive experiences in a wide variety of scenarios. The document describes in detail a robust coded representation of haptic media covering the two most popular haptic perceptions leveraged by devices today: vibrotactile and kinaesthetic. Support for other haptic modalities has also been integrated.

The coded representation allows to encode both descriptive and quantized data in a human readable JSON format used for exchange purposes, and a compressed bitstream version, optimised for memory usage and distribution purposes. This approach also allows to meet the expectations for compatibility with both descriptive and quantized formats, as required by the market, as well as interoperability between devices for 3D immersive experiences, mobile applications and other distribution purposes.

Information provided in this document related to the decoder is normative, while information related to the encoder and renderer is informative.

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 8601-1, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO 8601-2, *Date and time — Representations for information interchange — Part 2: Extensions*

ISO/IEC 21778:2017, *Information technology — The JSON data interchange syntax*

IETF RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*, available at: https://www.rfc-editor.org/info/rfc3986

IETF RFC 8259, *The JavaScript Object Notation (JSON) Data Interchange Format*, available at: https://www.rfc-editor.org/info/rfc8259

IETF RFC 4648, *The Base16, Base32, and Base64 Data Encodings*, available at: https://www.rfc-editor.org/info/rfc4648

3 Terms, definitions and abbreviated terms

3.1 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

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