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Information technology — Computer graphics, image processing and environmental data representation — Style representation for mixed and augmented reality

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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 24, *Computer graphics, image processing and environmental data representation*.

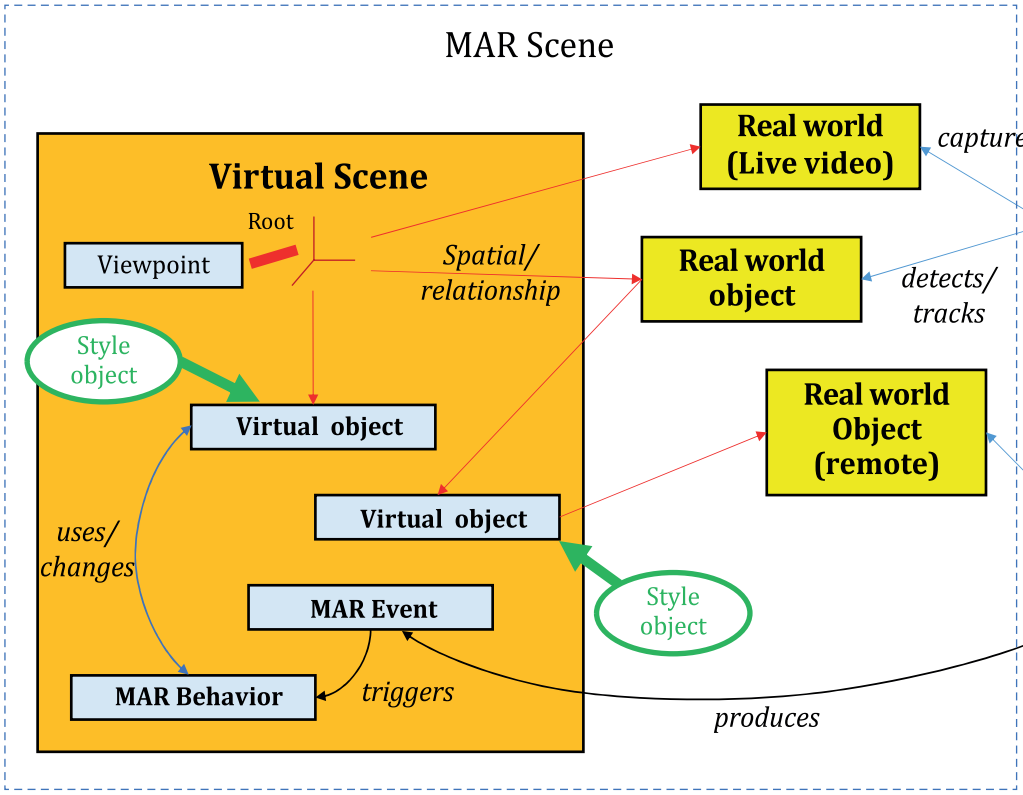
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Introduction

Mixed and augmented reality (MAR) refers to a spatially coordinated combination of media/information components that represent, on the one hand the real world and its objects and on the other hand those that are virtual, synthetic and computer generated. MAR as an information medium strives to provide rich experience based on realism, presence and augmentation [ISO/IEC 18039].

This document describes a set of information constructs for stylizing the MAR content and its objects. ISO/IEC 3721 specifies the MAR scene with the core objects and their attributes [ISO/IEC 3721] This document further refines ISO/IEC 3721 similarly to how CSS (Cascading Style Sheets)[2] augments HTML-5 (Hyper Text Markup Language)[1] for web document stylization. Among the various core MAR content objects defined in ISO/IEC 3721, virtual objects that augment real world objects may be subject to further stylization. Stylization refers to the act of making certain information follow a particular form for various purposes. As MAR contents become more widespread and sophisticated, there is an increasing need for its stylization and its separation from the core content for its efficient specification. The augmentation style can affect the whole MAR experience in terms of its naturalness (how harmonious objects appear in relation to the real world into which they are inserted), and conspicuousness and saliency (how augmentations stand out for visibility and readability). This in turn can be important for efficient information transfer through the MAR content. Style specification components are thus associated with and applied to the virtual objects used for augmenting the real world objects in the MAR content (see Figure 1).



The real world objects are associated or augmented with the virtual scene/objects shown within the left box. The style objects represent the constructs for further specifying their "styles" for presentation to the users.

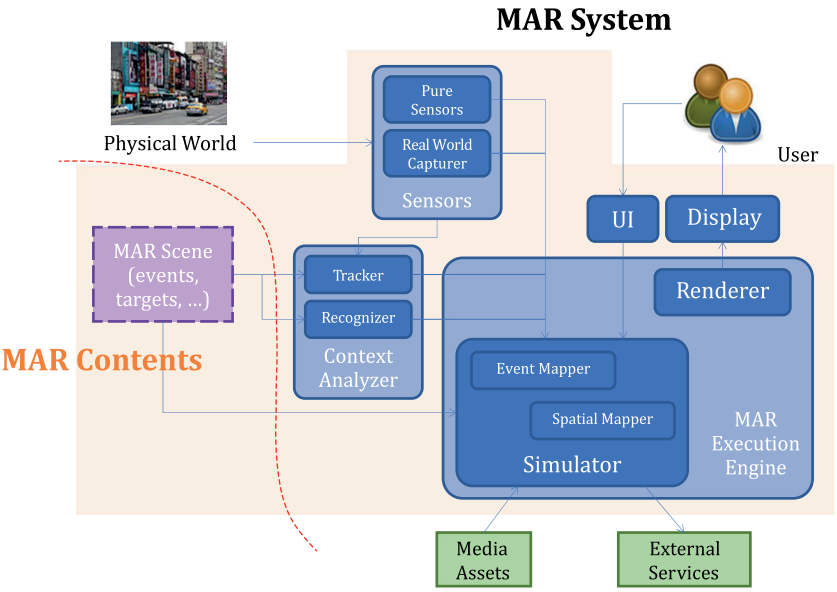
Figure 1 — The general structure of mixed and augmented reality (MAR) content [ISO/IEC 18039]

This work only establishes the information model, and neither promotes nor mandates the use of a specific language, file format, algorithm, device, or implementation method. It is to be considered as a minimum basic model and a sound basis that can be extended for other purposes in actual

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implementations (e.g. application standards, specific file formats). It is designed for ease, generality, and extendibility and is illustrated in this document with various examples and implementation results.

This document is based on ISO/IEC 18039 which specifies a reference architecture for the MAR system as a contents-browser/player. In ISO/IEC 18039, the MAR content is specified as the input to the MAR system that describes the scene and objects' behavior. The MAR system parses, simulates and renders the content to the display (See Figure 2).



The MAR Scene or equivalent content description is an input to the larger MAR system which will interpret it and render it to a display for user consumption [ISO/IEC 18039].

Figure 2 — The generic MAR system architecture

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1 Scope

This document specifies:

1) Constructs for representing and specifying various augmentation and presentation styles. While augmentations can be in modalities other than the visual (e.g. aural, haptic), this work addresses the visual augmentation style only.

2) A model for how to associate the stylization constructs to the augmentation objects. Specifically, the MAR behavior object in ISO/IEC 3721 is extended for this purpose.

3) Other miscellaneous functionalities and abstractions that support the stylization of augmentation objects.

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/IEC 18039, *Information technology — Computer graphics, image processing and environmental data representation — Mixed and augmented reality (MAR) reference model*

ISO/IEC 3721, *Information technology — Computer graphics, image processing and environmental data representation —Information model for mixed and augmented reality content — Core Objects and their Attributes*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 18039, ISO/IEC 3721, and the following 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/

3.1.1
stylization
act of enforcing certain information presentation to follow a particular form or behave in a given way for various purposes such as to highlight it, emphasize it, or make it more readable and perceptible

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