3GPP TSG SA WG4 eMeeting #123S4-230527r01

17th – 21st April 2023

**Source:** Samsung Electronics Co., Ltd.

**Title: [MeCAR] Addition of gaze point to interaction metadata**

**Document for** Discussion and Agreement

# 1. Introduction

In the last 122nd meeting, S4-230172 [1] about adding a gaze origin and a gaze direction to interaction metadata was agreed.

In addition to the proposed eye gaze information, this contribution proposes to add *gaze point* (from 8.2 View-related information), a location where the user's eyes are focused in a three-dimensional space to interaction metadata.

Note) The way of measuring the gaze point is out of scope of MeCAR. Device may have eye tracking cameras and sensors, and may perform calibration procedure to accommodate different disparity and different screen to eye distance by different face shapes.

By presenting the gaze point on a display of device, user can immediately recognize that the device is aware of user's interest. By delivering the gaze point to the split rendering function, a service provider may provide foveated process, i.e., differentiating processes with regards to whether the object is focused or not. Examples of such processes are as follows:

* the split rendering function may render the objects near the gaze point with higher quality thereby reducing the rendering workload by (greatly) reducing the image quality of objects in the peripheral vision.
* the split rendering function may provide depth of field effect for the other objects placed farther or closer than the gaze point to mimic human vision.
* the service provider may consider user has interest in none of the presented objects when user's focus is out of the presented range.

# 2. Proposed changes

[Change 1]

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| **AR/MR Data category** | **AR/MR**  **Data type** | **Definition** | **Media type description (Examples)** |
| **…** | **…** | **…** | **…** |
| **Interaction** | **AR Anchor** | The AR anchor is meant to identify a point in the user space to be used to anchoring a visual object (2D or 3D) | **Type**: Metadata allowing accurate overlaying/rendering of text, graphics or video contents to support Use Case 8 of TR 26.928.  **Organization:** None |
| **User Pose** | Clause 4.4.3.1 of 3GPP TR 26.998[1]  Representation of the user position and orientation | **Type**: It consists of a quaternion for orientation and a 3D vector for position. Timestamp is represented by a 64 bit monotonically increasing nano-second-based integer.  **Organization**: Khronos OpenXR |
| **FOV** | Y.6.2.3 of 3GPP TS 26.114[3]  The Field of View (FOV) is the extent of observable world at any given moment | **Type**: It consists of vertical fov and horizontal fov.  **Organization:** None |
| **Viewport** | Y.7.2 of 3GPP TS 26.114[3]  The viewport corresponds to the projection of the user View onto a target display | **Type**: It shall contain all of the parameters Viewport\_azimuth, Viewport\_elevation, Viewport\_tilt, Viewport\_azimuth\_range and Viewport\_elevation\_range  **Organization:** None |
| **Gesture** | TBD | **Type**: A array of finger joint position.  For example: <https://www.khronos.org/registry/OpenXR/specs/1.0/html/xrspec.html#XR_EXT_hand_tracking>  **Organization:** OpenXR |
| **Body action** | TBD | **Type**: bvh format.  **Frequency**: at least 1kHz  **Organization:** BioVision company |
| **Facial expression** | TBD | **Type**: An array of key point position.  For example: <https://www.khronos.org/registry/OpenXR/specs/1.0/html/xrspec.html#XrSystemFacialTrackingPropertiesHTC>  **Organization:** None |
| **Sensor information** | TBD | **Type**: a new interaction profile path  For example, OpenXR EXT format offers the possibility to developers to integrate and benefit from new controllers and sensor subsystems, (e.g., <https://registry.khronos.org/OpenXR/specs/1.0/html/xrspec.html#XR_EXT_hp_mixed_reality_controller>, etc.).  **Organization:** OpenXR |
| **Eye gaze** | Eye gaze typically consists of a gaze origin (a point positioned between the user’s eyes), a gaze direction, a ray pointing towards where the user is looking at, and gaze point, a three-dimensional position where the user is looking at. | **Type:** 3D vector for gaze origin and gaze point, a quaternion for gaze direction.  For example, OpenXR defines a new interaction profile path for eye gaze input:  <https://registry.khronos.org/OpenXR/specs/1.0/html/xrspec.html#XR_EXT_eye_gaze_interaction>, and Unity defines methods to get the gaze information: <https://docs.unity3d.com/ScriptReference/XR.Eyes.html>  **Organization:** OpenXR |

[Editor’s note]: The list of Media Type is a starting point and other types of AR media will be added.

Note) The way of measuring the gaze point is out of scope of this specification. Device may have eye tracking cameras, sensors, and may perform calibration procedures to accommodate different disparity and different screen to eye distance by different face shapes.

[End of change 1]

# 3. Proposal

It is proposed to adopt the proposed change in clause 2 to clause 3.7.2 of MeCAR PD v.0.5.1.

# 4. References

[1] S4-230172, "[MeCAR] Addition of eye gaze to interaction metadata"