|  |  |
| --- | --- |
| **Joint Collaborative Team on 3D Video Coding Extension Development**  **of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11**  1st Meeting: Stockholm, SE, 16–20 July 2012 | Document: JCT2-A0034 |

|  |  |  |  |
| --- | --- | --- | --- |
| *Title:* | **3DV SEI messages on depth perception** | | |
| *Status:* | Input document | | |
| *Purpose:* | Proposal | | |
| *Author(s) or Contact(s):* | Kwan-Jung Oh,  Jaejoon Lee,  Du-Sik Park | Email: | kwanjung.oh@samsung.com  jaejoon1.lee@samsung.com  dusikpark@samsung.com |
| *Source:* | Samsung Electronics Co., Ltd | | |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Abstract

In this proposal, 3DV SEI messages are proposed based on 3DV-ATM and 3DV-HTM. The proposal includes the following: 1) a picture/frame level SEI message for baseline distance; 2) a picture/frame level SEI message for zero parallax.

# Proposed SEI messages

A baseline is distance between the left and right camera. By adjusting the baseline distance between cameras, we are able to dynamically increase and decrease the depth perception in a scene. In the 3DV, we can adjust the baseline distance by changing the view point. It will be especially more useful for realistic stereo services. The proposed SEI message for baseline distance will be useful for it. Fig. 1 shows the relation between the baseline distance and object appearance to the screen.

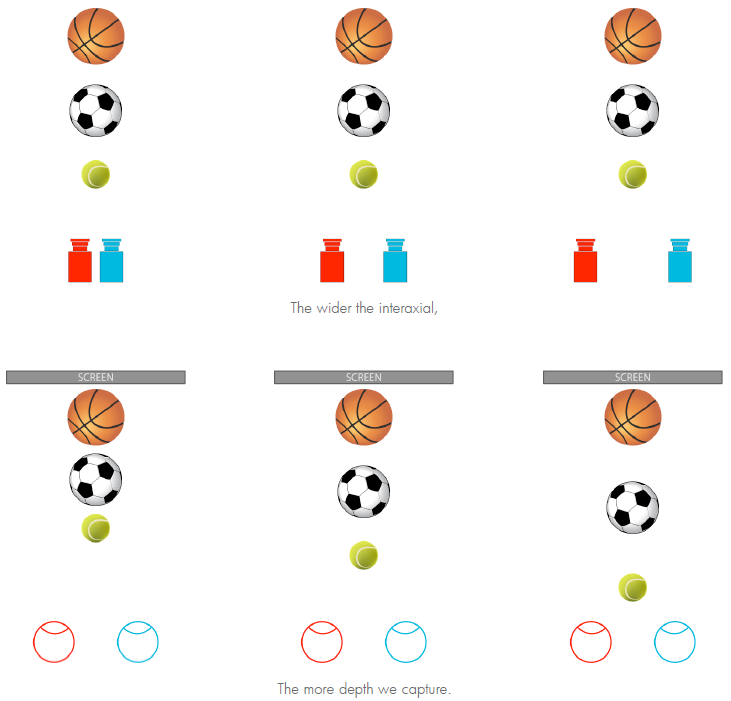


Fig. 1. Relation between the baseline distance and object appearance to the screen.

A zero parallax is a point of convergence for a left and right stereo pair. In current 3DV standard only considers 1D parallel camera arrangement. In that case, zero parallax value indicates the farthest background. Thus, all objects are always seen as located in front of screen. The current 3D displays calculate the proper zero-parallax a given scene for better 3D feeling. However, we can enjoy better 3D contents if we know the best zero-parallax intended by manufactures. The proposed SEI message for zero parallax will be useful for it. Fig. 2 shows the relation between the zero parallax and object appearance to the screen.

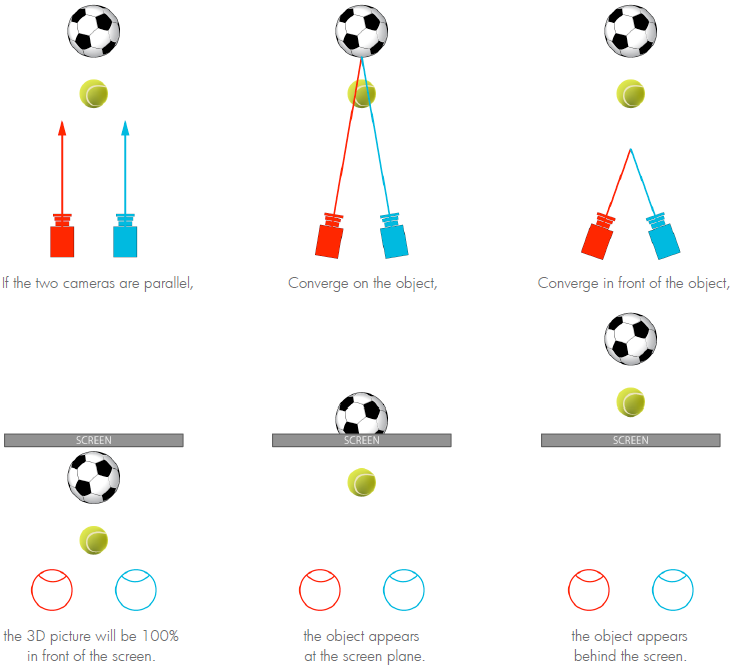


Fig. 2. Relation between the zero parallax and object appearance to the screen.

# Syntax on depth perception

|  |  |  |
| --- | --- | --- |
| 3d\_reference\_displays\_info( payloadSize ) { | C | Descriptor |
| if(IDR){ |  |  |
| **prec\_ref\_baseline** | 5 | ue(v) |
| **prec\_ref\_display\_width** | 5 | ue(v) |
| **ref\_viewing\_distance\_flag** | 5 | u(1) |
| **scale\_pixel\_shift** | 5 | ue(v) |
| **baseline\_update\_flag** | 5 | u(1) |
| **pixel\_shift\_update\_flag** | 5 | u(1) |
| if( ref\_viewing\_distance\_flag ) |  |  |
| **prec\_ref\_viewing\_dist** | 5 | ue(v) |
| **num\_ref\_displays\_minus1** | 5 | ue(v) |
| numRefDisplays = num\_ref\_displays\_minus1 + 1 |  |  |
| } |  |  |
| for( i = 0; i < numRefDisplays; i++ ) { |  |  |
| if(IDR){ |  |  |
| **exponent\_ref\_baseline[ i ]** | 5 | u(6) |
| **mantissa\_ref\_baseline[ i ]** | 5 | u(v) |
| **exponent\_ref\_display\_width[ i ]** | 5 | u(6) |
| **mantissa\_ref\_display\_width[ i ]** | 5 | u(v) |
| if(ref\_viewing\_distance\_flag) { |  |  |
| **exponent\_ref\_viewing\_distance[ i ]** | 5 | u(6) |
| **mantissa\_ref\_viewing\_distance[ i ]** | 5 | u(v) |
| } |  |  |
| **additional\_shift\_present\_flag**[ i ] | 5 | u(1) |
| if (additional\_shift\_present[ i ]) |  |  |
| **num\_pixel\_shift\_plus128** [ i ] | 5 | u(8) |
| } |  |  |
| if(!IDR){ |  |  |
| if(baseline\_update\_flag) | 5 | u(1) |
| **baseline\_ratio**[ i ] | 5 | u(8) |
| if(pixel\_shift\_update\_flag) | 5 | u(1) |
| **delta\_pixel\_shift**[ i ] | 5 | u(8) |
| } |  |  |
| } |  |  |
| } |  |  |

IDR means that whether the current frame has a same POC with the IDR frame or not.

**scale\_pixel\_shift** specifies scale value for the pixel shift. The pixel shift is calculated by

pixel shift = pixel shift \* scale\_pixel\_shift

**baseline\_update\_flag** equals to 1 indicates that the baseline is updated for each picture/frame. baseline\_update\_flag equals to 0 indicates that the baseline is not updated for each picture/frame.

**pixel\_shift\_update\_flag** equals to 1 indicates that the pixel shift is updated for each picture/frame. pixel\_shift\_update\_flag equals to 0 indicates that the pixel shift is not updated for each picture/frame.

**baseline\_ratio[i]** specifies the ratio value of baseline. The value of baseline\_ratio[i] shall be in the range of 0 to 255, inclusive for 8 bit-level data. The following equation is used for calculating the updated baseline distance for the adaptive depth perception.

if(baseline\_ratio[i]%2 ==0){

updated baseline = baseline \* ( 1-baseline\_ratio[i]/256);

}

else{

updated baseline = baseline \* (1+(baseline\_ratio[i]+1)/256);

}

**delta\_pixel\_shift[i]** specifies the horizontal shift. The value of delta\_pixel\_shift[i] shall be in the range of 0 to 255, inclusive for 8 bit-level data. The following equation is used for calculating the updated shift value for the adaptive depth perception. The left and right views are shifted by half of the pixel shift value, respectively.

if(delta\_pixel\_shift[ i ]%2 ==0){

updated pixel shift = pixel shift -1\*delta\_pixel\_shift[i] /2;

}

else{

updated pixel shift = pixel shift + (delta\_pixel\_shift[i]+1) /2;

}

# Conclusion

The picture/frame level SEI messages for baseline distance and zero parallax are proposed. The proposed SEI messages will be useful for content dependent depth perception.

# Patent right declaration(s)

**Samsung Electronics Co., Ltd. may have IPR relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).**