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| Re: |  |
| Abstract | Interactive content based on gesture recognition connected with existing depth camera is offering silhouette information of user inputted in camera. Therefore, user can't recognize content about data and occur error that system is detecting every situation enough, just using image information drawn by depth camera. The error lowers quality of content and can occur trouble between user and content provider. This standard delivers movement status and degree of user that camera is recognizing about all gestures of user to system and defines symbol system to offer specific information to user. |
| Purpose | This contribution document is to define system showing information that user is recognizing about status and degree of movement as symbol to offer environment that interaction between user and gesture recognition content system can be made smoothly utilizing depth camera. |
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**Symbol System of User Recognition Information for Interactive Content**

**1. A general outline**

As depth cameras have become widely available in the public, an environment has been created in which content that recognizes users' motion and encourages users to interact with the context based on their perceived data can be serviced. However, if depth cameras fail to allow users to recognize that they have detected them, they will continue to wave their hands in the air, or wander around in areas where motion can be perceived. This inconvenience has been a serious problem for users using depth camera-based content that utilizes motion recognition as an interactive interface. Currently, most depth camera-based content shows a silhouette of the user in the lower right corner, but is separate from recognizing the user's In other words, just because a user's appearance is represented by a silhouette does not mean that the system is ready to recognize user behavior and incorporate that behavior into the content. This is because it is a different issue for the system to recognize whether the target, which is seen as a silhouette of the front, is a user who wants to issue commands through motion.

In order for the system to inform the user of the recognition status and receive input from the user on a smooth representation method, the contents must be expressed on the user's display in some way. It is effective to systematically represent symbols to express the recognition status of depth cameras additionally while providing various content UI to user displays.

This standard aims to promote smooth interaction between the content system and users by providing accurate information on the status and extent of the user's operation recognized by the depth camera, thereby enhancing the usability and commercial value of the content.

**2. Context of the standard**

This standard is a symbolic framework for user motion recognition status information to be used in content which is intended to interact with users using depth cameras.

First, defines a user perceptible symbol for expressing how many users were perceived based on the number of users designed for content from one to four, indicating whether the depth camera recognized users.

Second, to prevent users from deviating from the perception range of depth cameras, it is defined by classifying them according to the number of users.

**3. User recognition symbol usage environment**

**3.1. User and Content Environment**

**In developing content that recognizes the user's motion using depth cameras and interacts with the input of the perceived motion, the environment should be configured to let the user know how the system identifies the user's recognition status.**

**3.2. User recognition process**

When the user moves, the depth camera recognizes the user's motion. Furthermore, if the user is not accurately recognized, the depth camera constantly seeks input signals to find the target person. The input signal is human skeleton information and is not recognized as human without skeleton information.

The human movement recognition system also checks that the number of people required by the program is recognized through the depth camera, and tells the user if the operation is in progress, within a specified range, or when trying to get out of the area, which direction to move into the correct area.

**4. Classification of user recognition states**

**4.1. Components of Symbolic System**

User recognition information symbols for interactive content classify symbols according to their respective classification codes for the user's perception and representation of the user's perception range.

**4.1.1 Classification code system**

Classification codes are divided into user recognition classification codes and user recognition range classification codes.

**4.1.2. User recognition classification code**

User recognition classification codes are used by linking the delimiter "BCR" and the serial number of code numbers to "dash (-).

**4.1.3. User recognition range classification code**

The user recognition range classification code is used by connecting the delimiter "BCA", one digit of the number of users, and four digits of each number of users.

**4.2 Classification of symbols**

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| **Symbols** | **Content** | **Note** |
|  | Number of users programmed in interactive content and unrecognized user symbols | used in duplicate according to the number of people. |
|  | Recognized user symbols among the number of users programmed in interactive content | used in duplicate according to the number of people. |
|  | User symbols that are recognized to be exceeded the number of users programmed in interactive content | Use only one, regardless of the number of people exceeded. |
|  | User recognition area symbol programmed by interactive content |  |
|  | User symbols located exactly within the user recognition area |  |
|  | User symbols that span the area before exiting the user recognition area |  |

**4.3. User Recognition**

The maximum limit for a depth camera to effectively recognize a user is four people, which can be represented by symbols as shown in Table 6-1 for the degree of recognition.

The maximum people to be recognized is represented in white, the person to be recognized is represented in blue, and represented in red if the number of people to be recognized is exceeded. This is color-coded on the premise that most displays that work with depth cameras support true colors. However, if the display does not support the color, it shall be represented as gray in blue and black in red.

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| --- | --- | --- | --- |
| **Code** | **Symbols** | **Content** | **Note** |
| BCR-001 |  | one person to be recognized, and one person is not recognized |  |
| BCR-002 |  | one people is recognized and one people is recognized |  |
| BCR-003 |  | two people to be recognized and two people not recognized |  |
| BCR-004 |  | two people to be recognized and one person is recognized |  |
| BCR-005 |  | two persons to be recognized and two peple are recognized |  |
| BCR-006 |  | 3 persons to be recognized and 3 persons not recognized |  |
| BCR-007 |  | If three people to be recognized and one person is recognized |  |
| BCR-008 |  | 3 people to be recognized and 2 peeple are recognized |  |
| BCR-009 |  | 3 people to be recognized and 3 people are recognized |  |
| BCR-010 |  | 4 persons to be recognized and 4 persons not recognized |  |
| BCR-011 |  | 4 people to be recognized and one person is recognized; |  |
| BCR-012 |  | 4 people to be recognized and 2 people are recognized |  |
| BCR-013 |  | 4 people to be recognized and 3 people are recognized |  |
| BCR-014 |  | 4 people to be recognized and 4 persons are recognized |  |
| BCR-015 |  | one person to be recognized and one person is recognized |  |
| BCR-016 |  | 2 people to be recognized and more than two people are recognized; |  |
| BCR-017 |  | 3 people to be recognized and more than three people are recognized; |  |
| BCR-018 |  | 4 people to be recognized and more than 4 people are re recognized. |  |

**4.4. The range of user recognition**

The symbol for the user recognition range defines a recognizable symbol that tells the user if the user is recognized within the position range, where he or she is trying to deviate from the recognition range, and allows the user to come within the range of recognition.

**4.4.1. 1 user recognition range**

In this, it is a symbol to suggest that a user can be recognized if one user is within the range of recognition area or if the user tries to deviate from the four directions.

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| --- | --- | --- | --- |
| **Code** | **Symbols** | **Content** | **Note** |
| BCA-1001 |  | Where one user is correctly located within the recognizable range; |  |
| BCA-1002 |  | One user is trying to exit to the back the recognizable range. |  |
| BCA-1003 |  | One user is trying to exit the left side of the recognizable range. |  |
| BCA-1004 |  | One user is trying to exit to the front to the recognizable range. |  |
| BCA-1005 |  | One user is trying to exit the right side of the recognizable range. |  |

**4.4.2. Two-person User recognition Range**

In this, it is a symbol to suggest that the user can be recognized if two users are within the range of recognition or if each of the two tries to deviate from the four directions.

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| --- | --- | --- | --- |
| **Code** | **Symbols** | **Content** | **Note** |
| BCA-2001 |  | Two users are correctly located within the recognition range |  |
| BCA-2002 |  | One of the two users on the right wants to leave behind the recognition range. |  |
| BCA-2003 |  | The right one of the two users tries to leave the recognition range to the right. |  |
| BCA-2004 |  | One of the two users on the right tries to move out to the front of the recognition range. |  |
| BCA-2005 |  | One of the two users on the left wants to leave behind the recognition range. |  |
| BCA-2006 |  | The left one of the two users tries to leave the recognition range to the left. |  |
| BCA-2007 |  | One of the two users on the left tries to move out of the recognition range. |  |
| BCA-2008 |  | Both users attempt to leave behind the recognition range. |  |
| BCA-2009 |  | If one of the two users tries to leave behind the recognition range and the other on the right tries to leave the recognition range to the right |  |
| BCA-2010 |  | If one of the two users tries to leave behind the recognition range and the other on the right tries to leave the recognition range to the front. |  |
| BCA-2011 |  | If one of the two users tries to leave behind the recognition range and the other one tries to leave the recognition range to the left. |  |
| BCA-2012 |  | If one of the two users tries to leave behind the recognition range and the other on the left tries to leave the recognition range. |  |
| BCA-2013 |  | If one of the two users tries to leave the recognition range to the right and the other left to the left. |  |
| BCA-2014 |  | If one of the two users tries to exit the recognition range in front of the right and one of the left, respectively, to the left of the recognition range. |  |
| BCA-2015 |  | If one of the two users tries to leave behind the recognition range and the other on the left tries to leave the recognition range. |  |
| BCA-2016 |  | If one of the two users tries to leave the recognition range to the right and the other to the left to the front of the recognition range, respectively. |  |
| BCA-2017 |  | Both users are trying to get out of the recognition range. |  |

**4.4.3. 3 users recognition Awareness Range**

In this, it is a symbol to suggest that the user can be recognized if three users are within the range of recognition or if each of the three tries to deviate from the four directions.

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| **Code** | **Symbols** | **Content** | **Note** |
| BCA-3001 |  | Three users are correctly located within the recognition range |  |
| BCA-3002 |  | one out of three users tries to leave behind the recognition range |  |
| BCA-3003 |  | two out of three users, except one on the left, attempt to leave behind the recognition range |  |
| BCA-3004 |  | Except for one person on the left of the three users, one on the back and one on the right, respectively, trying to escape the recognition range |  |
| BCA-3005 |  | Except for one person on the left of the three users, one person on the middle is to the back and one person on the right is to be out of the recognition range |  |
| BCA-3006 |  | two out of three users, excluding one on the right, attempt to leave behind the recognition range |  |
| BCA-3007 |  | Except for one person on the right of the three users, one person in the middle is to the back and one person on the left is to leave the recognition range |  |
| BCA-3008 |  | Except for one person on the right of the three users, one person in the middle tries to leave the recognition range to the back and one person on the left tries to leave the recognition range. |  |
| BCA-3009 |  | All three users attempt to leave behind the recognition range. |  |
| BCA-3010 |  | one of the three users tries to leave the recognition range to the left and the other two to the back. |  |
| BCA-3011 |  | one of the three users tries to move forward and the other two backwards out of the recognition range. |  |
| BCA-3012 |  | one of the three users tries to leave the recognition range by right side and the other two by back side. |  |
| BCA-3013 |  | one of the three users tries to leave the recognition range by right side and the other two by back side. |  |
| BCA-3014 |  | one of the three users tries to leave the recognition range behind and the other two forwards |  |
| BCA-3015 |  | One out of every three users is trying to get out of the recognition range to the front. |  |
| BCA-3016 |  | Except for one person on the left of the three users, where one person in the middle tries to go forward and one person in the right tries to leave the recognition range |  |
| BCA-3017 |  | 사용자 3인중 좌측 1인을 제외하고, 가운데 1인은 앞쪽으로, 우측 1인은 우측으로 각각 인식범위를 벗어나려고 하는 경우Except for one person on the left of the three users, one person in the middle is about to go forward and one person on the right is about to go out of the recognition range |  |
| BCA-3018 |  | Except for one left of the three users, the other two are trying to move forward and out of the recognition range. |  |
| BCA-3019 |  | Except for one left of the three users, the other two are trying to move forward out of the recognition range. |  |
| BCA-3020 |  | Except for one person on the right of the three users, one person in the middle wants to go forward and one person on the left wants to go out of the recognition range. |  |
| BCA-3021 |  | Except for one on the right out of three users, the other two try to move forward out of the recognition range. |  |
| BCA-3022 |  | one of the three users is about to get out of the recognition range, one in front and the other two in back |  |
| BCA-3023 |  | one on the middle of the three users tries to get out of the recognition range to the front, one on the left to the left, one on the right to the back. |  |
| BCA-3024 |  | one of the three users tries to leave the recognition range behind and the other two forwards, respectively. |  |
| BCA-3025 |  | one on the right side of the three users tries to get out of the recognition range to the right, one on the middle to the front and one on the left to back side. |  |
| BCA-3026 |  | one on the left out of the three users tries to leave the recognition range behind and the other two to the front, respectively. |  |
| BCA-3027 |  | All three users are trying to get out of the recognition range to the front. |  |
| BCA-3028 |  | one of the three users on the right tries to leave behind the recognition range |  |
| BCA-3029 |  | One of the three users on the right tries to leave the recognition range to the right. |  |
| BCA-3030 |  | One of the three users on the right tries to move out of the recognition range. |  |
| BCA-3031 |  | If one of the three users on the left tries to leave behind the recognition range |  |
| BCA-3032 |  | One of the three users on the left tries to exit the recognition range to the left. |  |
| BCA-3033 |  | One of the three users on the left tries to move out of the recognition range. |  |
| BCA-3034 |  | two out of three users, except one on the middle, attempt to leave behind the recognition range |  |
| BCA-3035 |  | Except for one of the three users, one person on the left is about to leave the recognition range to the left, and one on the right is about to leave the recognition range to the back |  |
| BCA-3036 |  | Except for one of the three users, one person on the left is about to leave the recognition range to the front, and one on the right is about to leave the recognition range to the back |  |
| BCA-3037 |  | Except for one of the three users on the middle, one on the left is about to leave the recognition range to the back and one person on the right is to leave the recognition range to the right respectively |  |
| BCA-3038 |  | Except for one of the three users on the middle, one person on the left is to leave the recognition range to the left and one person on the right is to leave the recognition range to the right. |  |
| BCA-3039 |  | Except for one of the three users on the middle, one person is to leave the recognition range to the front, and one person on the right is to leave the recognition range to the right. |  |
| BCA-3040 |  | Except one of the three users on the middle, one on the left tries to leave the recognition range behind and one person on the right tries to leave the recognition range forward. |  |
| BCA-3041 |  | Except for one of the three users on the middle, one person on the left is to is to be out of the recognition range to the left and one person on the right is to be out of the recognition range to the front . |  |
| BCA-3042 |  | Except for one of the three users on the middle, the two on the left and right are about to leave the recognition range to the front. |  |

**4.4.4. 4 people User recognition Range**

In this, it is a symbol to suggest that the user can be recognized if the four users are within the range of recognition or if each of the four tries to deviate from the four directions.

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| **Code** | **Symbols** | **Content** | **Note** |
| BCA-4001 |  | four users are correctly located within the recognition range |  |
| BCA-4002 |  | Where one person on the left, except for three out of four users, tries to leave behind the recognition range |  |
| BCA-4003 |  | one person on the left, except for three out of four users, tries to leave the recognition range to the left. |  |
| BCA-4004 |  | one person on the left, except for three out of four users, tries to leave the recognition range to the front. |  |
| BCA-4005 |  | one person on the left, except for three out of four users, tries to leave the recognition range to the back. |  |
| BCA-4006 |  | one person on the left, except for three out of four users, tries to leave the recognition range to the right. |  |
| BCA-4007 |  | one person on the left, except for three out of four users, tries to leave the recognition range to the front. |  |
| BCA-4008 |  | Except for two on the left and right, two out of the four users on the middle, try to leave behind the recognition range. |  |
| BCA-4009 |  | The second from the left out of the four users is about to leave the recognition range to the back, and the fourth user to the right, respectively. |  |
| BCA-4010 |  | The second from the left out of the four users tries to leave the recognition range to the back, the fourth user to the front. |  |
| BCA-4011 |  | The first user from the left out of the four users is about to live the recognition range to the left, and the third user from the left to the back. |  |
| BCA-4012 |  | The first user from the left out of the four users is about to live the recognition range to the front, and the third user from the left to the back. |  |
| BCA-4013 |  | The second and third user on the left of the four users are all trying to get out of the recognition range forward. |  |
| BCA-4014 |  | The first one from the left out of the four users is about to leave the recognition range to the left, the first one from the right is about to leave the recognition range to the right. |  |
| BCA-4015 |  | The first and second from the left out of the four users are about to leave the recognition range to the back. |  |
| BCA-4016 |  | The first one from the left is about the leave the recognition range to the left, the second one from the left to the back respectively. |  |
| BCA-4017 |  | The first one from the left is about the leave the recognition range to the front, the second one from the left to the back respectively. |  |
| BCA-4018 |  | The first one and the second one from the left is about to leave the recognition range to the left. |  |
| BCA-4019 |  | The first one and the second on from the left out of the four users, is about to deviate from the recognition range to the left and front respectively. |  |
| BCA-4020 |  | the first one and the second one from the left out of four users both attempt to move forward out of the recognition range. |  |
| BCA-4021 |  | The third and fourth users from the left out of the four users are all trying to exit the recognition range backwards. |  |
| BCA-4022 |  | The third and fourth users from the left out of the four users are all trying to exit the recognition range to the back and to the right respectively. |  |
| BCA-4023 |  | The third and fourth users from the left out of the four users are all trying to exit the recognition range to the back and to the front respectively. |  |
| BCA-4024 |  | The third and fourth users from the left out of the four users are all trying to exit the recognition range to the right. |  |
| BCA-4025 |  | The third and fourth users from the left out of the four users are all trying to exit the recognition range to the front and to the right respectively. |  |
| BCA-4026 |  | The third and fourth users from the left out of the four users are all trying to exit the recognition range to the front. |  |
| BCA-4027 |  | The second, third, and fourth from the lest out of the four users are all trying to exit the recognition range to the back. |  |
| BCA-4028 |  | The second, third, and fourth from the lest out of the four users are all trying to exit the recognition range ,the first two to the back and the third to right. |  |
| BCA-4029 |  | The second, third, and fourth from the lest out of the four users are all trying to exit the recognition range ,the first two to the back and the third to front. |  |
| BCA-4030 |  | The first user from the left out or the four users is about to leave the recognition range to the left, and the second and third from the left to the back. |  |
| BCA-4031 |  | The first user from the left out of the four users is about to leave the recognition range to the front, and the second and third users are to the back, respectively. |  |
| BCA-4032 |  | The four users are all about to leave the recognition range to the front. |  |
| BCA-4033 |  | The first one from the left out of the four users is about to move out of the recognition range to the left, the rest of three are to the front. |  |
| BCA-4034 |  | the first one from the left out of the four users tries to leave the recognition range behind and the other three forwards, respectively. |  |
| BCA-4035 |  | the first one from the right out of the four users tries to leave the recognition range to the right and the other three forwards, respectively. |  |
| BCA-4036 |  | the first one from the right out of the four users tries to leave the recognition range to the backward and the other three forwards, respectively. |  |
| BCA-4037 |  | The first one from the left out of the four users tries to leave the recognition range to the left, the second and third one to the front, and the firth one to the right . |  |
| BCA-4038 |  | The first one from the left out of four users is about to leave the recognition range to the right, second one to the backward, third one to the front, firth one to the right, respectively. |  |
| BCA-4039 |  | The first one from the left out of four users is about to leave the recognition range to the right, second and third one to the backward, firth one to the right, respectively. |  |
| BCA-4040 |  | The first one from the left out of four users is about to leave the recognition range to the right, the rest of three to the backward. |  |
| BCA-4041 |  | The first one from the right out of four users is about to leave the recognition range to the right, the rest of three to the backward. |  |
| BCA-4042 |  | The four users is about to leave the recognition range to the backward. |  |

**5. Application of Symbols**

In accordance with the symbolic framework of this standard, the application of the content in production is referred to the following paragraphs.

(A) The size of the symbol may be changed at will, but its shape shall be observed. However, it is okay to make changes according to the needs of contents such as thickness and color of lines.

(B) The location of the symbol is displayed to the user for recognition.

(C) The symbols 4.1 and 4.2 are used in combination, and the position between the two symbols shall be placed evenly. However, the sequence may be changed as necessary.

(D) For those not specified in this standard or insufficient in this standard, it is recommended to be presented in accordance with a combination of basic symbols, or in accordance with a combination of other symbols or letters.