VR Navigation using LeapMotion and Oculus Rift



After some holistic research about the possible ways to implement navigation into our VR spaces, the best method for us would be to use specific hand gestures to imply movement ad increasing/decreasing velocity. The following information/implementation was gathered directly from my research of the subject:

**Hand Gesture Design For Movement Control**

**A. Forward Movement**

For hand gesture if user wants to move the avatar forward in our method just raise a user's hand in front of their face with palm direction straight ahead. Try to open hand for better detection and control palm normal always forward.

**B. Backward Movement**

To move avatar backward (user still looking straight ahead not turn back) our method will use the hand gesture appearance to turn the direction of the palm or flipping the hand facing the body. In this case palm normal will point to the back of the user.

****

All hand gesture for movement control (a) gesture for forward movement (b) gesture for backward movement (c) gesture for left step (d) gesture for right step (e) gesture for hold position



User's perspective view from first person controller by difference hand gesture (a) when user move forward (b) when user move backward (c) when user step left (d) when user step right (e) when user stop movement

**C. Step Left and Right**

Side step in this case does not turn left or turn right, but it means walk step to left side or right side while character's face continue looking forward. To move a character step left by hand gesture we will push the palm to the left hand side. As same as step left, step right will push the palm to right hand side by rotating the wrist down out of the body.

**D. Stop (Hold Position)**

To hold position of the character during moving with hand gesture there are 2 methods to do. The first way is grasping the hand another way is taking the hand out of display area. If no hand enables, character will stop immediately and move again when take the hand into the display.

**E. Speed Control**

We separated speed controller into 3 cases such as forward speed, backward speed and step side speed. For forward speed, users are able to increase movement speed by pushing the palm more forward. If user pushes less it will affect a little speed up, but if the user pushes more it will increase the more speed too. In case of backward speed, user can adjust moving backward speed by push and pull their hand. However, it has conversed way if user would like to speed up backward they have to pull their hand into their body. For step left and right speed is up to user pushing their hand to side of the screen more or less.

Further details about code implementation can be found at:

<http://ieeexplore.ieee.org/xpls/icp.jsp?arnumber=7219818>