VR/AR Interaction devices

Explanation of device features

Project by Gaurav Ghorpade

Control Scheme

- I am proposing a Hybrid Control Scheme with
1) Wand Type Controller
2) Glove Exoskeleton Controller

Note that both are being used simultaneously. The wand will be in your left hand and the glove will be in your right hand in most applications.

(For a right-handed person)

Wand Justification

- A wand type controller allows you to incorporate a trigger, joystick, buttons etc.

- Thus a control scheme with only gloves cannot incorporate easily the features offered by a wand or a joystick.

- Putting buttons on the back of a glove involves suspension of natural interaction to access the buttons.

- With my wand you can press the buttons during a natural VR interaction

Glove Justification

- A glove will allow for many natural interactions in VR such as grabbing, pointing, throwing, picking , pulling, pushing in a very natural way.

- Specifically a haptic glove will allow for incorporation of cues which can enhance immersion.

- Of all the fingers, I believe the index finger is the most important for haptic feedback.

Glove Contd.

- Other haptic gloves such as the Dexta only allow for on-off control. This is not sufficient as it cannot represent interaction dynamics.
- My glove will attempt impedance control.
- This will allow for the creation of a squishy virtual object
- It will also allow you to feel the tension in a bow etc.

Wand Design

The wand contains
1) IMU for position and orientation tracking
2) Misc. buttons and joystick for various input options

This design is modular so you can switch out the parts and use the type of buttons you need for your application.

3) A motor connected to a rotating disc. When the motor is turned, it generates a reactive torque which will be used for haptic feedback such as gun recoil, bow handshock etc. Note: this is not an unbalanced rotor for vibration.
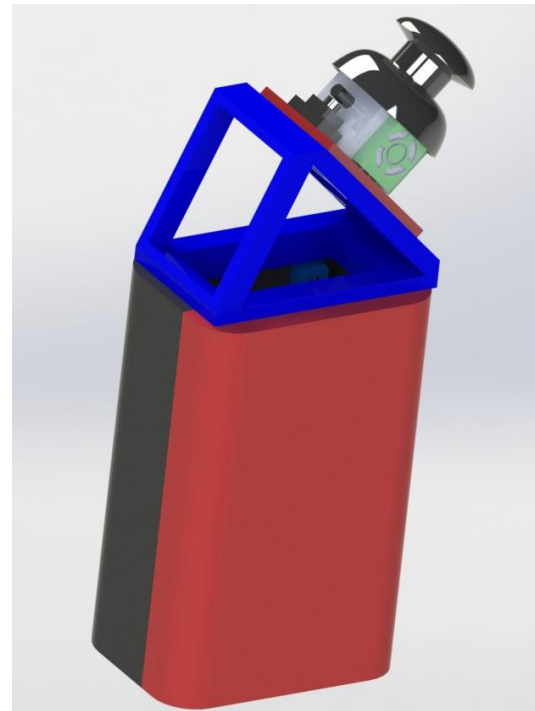
Glove Design

- Work in progess:
- It will use an IMU for wrist position and orientation
- It will use either IMU's, flex sensors, or encoders to track dominant angular orientation of fingers
- It will use either a linkage or a string mechanism for force transmission.

Locomotion Problem

- I will probably add a third ankle bracelet module which will be used to track a foot for the motion interaction.

- The user will step with one foot forward in the direction of choice. The virtual avatar will then move in that direction.

- User can return to natural physical movement by pressing a button on the wand.

- Jumping, crouching can be enabled using natural movements.