

INTERACTIVE CHAIR

for Navigating 3D Virtual Space

Introduction

This project aims at designing and implementing the chair as a body-oriented interface to navigate and socially behave in the 3D virtual space. In most 3D applications such as video games and online 3D communities, we are engaged with the virtual world through the lens of perspective camera, which pretends that our body is located in that world over the screen. While this assumes that our head and gaze are confined within our bodily orientation all the time, the ways in which we behave in the real world are based on decoupled body regions and orientations [1].

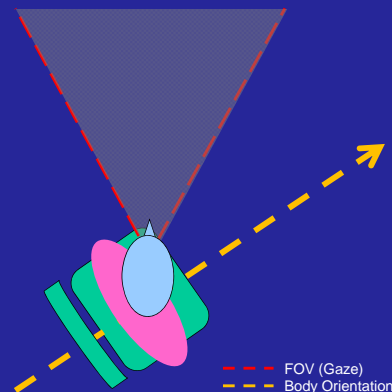
Most of all, our direction of gaze is quite often separated from the direction toward which our body faces or moves. Particularly, our perceptual action largely depends on our sensorimotor skills such as turns of eyes and head [2]. When we interact with the virtual world, however, we lose the possibility of such skillful actions due to the narrow channel of interface.

Using our physical body (i.e. leaning upper body to front, back, left or right) in navigating the virtual world can bring us several benefits. Firstly, it does not require the conscious process as much as the use of mouse, keyboard or joystick, since it is normally what we do when we walk around the physical world. Secondly, the use of body in navigating can release both hands free to manipulate other devices, so that more actions (e.g. gestures) can be occurred concurrently. This possibility will be investigated and prototyped in the final project.

[1] Schefflen, A. 1976. *Human territories: how we behave in space-time*. Prentice-Hall.

[2] Noë, A. 2004. *Action in Perception*. MIT Press.

- Looking around the virtual world while sitting on the (physical) chair



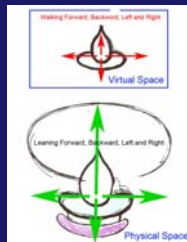
Future Work (Final Project)

WALKING around the virtual world

By leaning upper body forward, backward, left or right on the chair, users will be able to WALK around the virtual space.

This way of navigation does not require the conscious process as much as the use of mouse, keyboard or joystick, since it is normally what we do when we walk around the physical world.

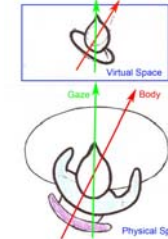
Also, the use of body in navigating can release both hands free to manipulate other devices, so that more actions (e.g. gestures) can be occurred concurrently.



Implementation

1) Control of the gaze direction decoupled from the body orientation

- By rotating his or her body on the swivel chair, the user can look around the surroundings, while keeping the body constantly oriented in the virtual space. This enables, for example, changing the gaze direction even during walking toward a particular destination. It also allows multiple users to communicate "face-to-face" through their avatars, by providing them with a natural way (like what we normally do in the physical world) to make an eye contact to one another, without necessarily rotating the whole body.



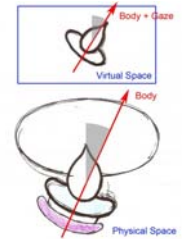
Change the direction of gaze by swiveling the chair



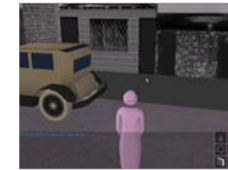
Turn the gaze back to the body orientation by returning back to the original posture

2) Control of the body orientation

- The proposed interface shall be able to translate the user's intention to rotate the entire body orientation (including the gaze direction) as well. The distinction between coupled and decoupled orientations can be made by utilizing typical postures of human body in the desktop-chair setting, e.g. putting elbows on either the front-end of desk or the armrests of the chair (i.e. the whole body rotates when elbows are not pressing either the desk or the armrests).



Change the body orientation by rotating the chair without putting elbows on the desk



The direction of gaze will follow the body orientation

Interaction Loop

