

# Grab & Pull : A new move paradigm for VR

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## Abstract

*This paper presents a new paradigm to move in Virtual Reality space, that would reduce cinetose while still providing a physical and natural sense of movement.*

## 1. Introduction

Moving in VR is kind of a paradox: unless you have a very large space and can do free walk or redirected walking, you're stuck simulating in-place displacement. The most natural option then involve an expensive and cumbersome threadmill, which few can afford or want to.

A cheaper approach is either gamepad-based displacement, meaning pushing a button to move forward, which is a high factor of motion sickness since no physical action is linked to that displacement, or teleport, meaning pointing a place, and click to teleport there, which cause no motion sickness but is spatially confusing and feels unnatural.

## 2. Grab & Pull

Grab & Pull is the action of grabbing the environment with a 3D controller (even if there's nothing physical to grab) and pulling the grabbed point towards you to move forward. This way a physical action is linked to the displacement, reducing motion sickness. There are two ways the brain can interpret that : either the body is moved through the environment, or the environment move around the body. Either way, it's a plausible explanation for the displacement.

3D controllers for VR usually comes in pair, one for each hand. Grabbing and pulling with both controllers in sequential movements allows continuous displacement. Thoses movements could have physical inertia applied to them, similar to the scrolling of a web page on a mobile device. Experiments must determine if adding inertia would cause motion sickness or not.

Additional movements could include strafing, going backward, climbing, and even turning. Experiments must determine if turning this way would cause motion sickness and if so, if it would not be better to let the player turn its body instead.

Scale of action doesn't have to be 1:1. Pulling 1 feet could equal to moving 2 or 3 feet. The brain easily adjusts to thoses scales, like using a mouse device on a computer : moving an inch with the hand usually results in moving the pointer several inches on the screen.

Expected result would be natural motion while keeping cinetose low due to the physical action of arms on the virtual world.