GestureDrawer Demo: One-Handed Interaction Technique for Spatial User-Defined Imaginary Interfaces

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ABSTRACT

We present a demonstration of *GestureDrawer*, a one-handed interaction with a 3D imaginary interface.

CCS CONCEPTS

• **Human-centered computing~Gestural input** • **Human-centered computing~User interface design** • **Human-centered computing~User centered design**

KEYWORDS

Interaction technique: gestures; imaginary interfaces; spatial user interfaces; screen-less; ubiquitous computing

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1 INTRODUCTION

The *GestureDrawer* interaction technique results into the following interaction principle:

Firstly, we define the starting point (anchor) of a 3D horizontal menu (further called *drawer*) by making a grasp gesture on a preferred position in 3D space. Once the anchor is set, we hold-on to the grasp gesture and open the *drawer* with a horizontal hand-motion to the right. Next, the grasp gesture is released, setting the end-point and the length of the *drawer* based on the length of the hand motion. A certain number of interface controls (defined by the application) can then be positioned into the *drawer*. Simultaneously, by performing the *drawer* opening action, we acquired an understanding of the interaction space (i.e. anchor, length and end-point of the *drawer*) via proprioception and visuospatial means. With this knowledge, we then create an imaginary user interface, by logically dividing the *drawer* into multiple areas (controls) and store it in our visuospatial short-term memory.

Afterwards, once we want to select or manipulate a certain control, we retrieve the control's position from our imaginary interface and move our hand to the appropriate position in empty 3D space. Just by using imagination and without any visual feedback, we simply grasp and immediately release a single control to make a selection. If we hold on to the grasp gesture and move our hand, we can manipulate the control's functionality/parameter in one to up to three Degrees of Freedom (DOF).

Concluding, in our demo users can experience 3D imaginary interaction (with invisible controls), spatial direct manipulation, one-handed interaction, user-defined user interfaces, and get an impression on accessibility, expressiveness and performance of our *GestureDrawer* concept.

2 DEMO EXPERIENCE

In our demonstration users are instructed to stand in front of a desk with a Microsoft Surface tablet and a Leap Motion sensor, placed on top of it. The Leap Motion sensors is used to track the users' interacting hand. Users are then instructed to perform the *GestureDrawer* interaction technique to test three demo applications, which show the advantage of *GestureDrawer* in the automotive domain:

- Setting navigation pins on a map (3 controls): Users open a *drawer* with three controls. By grasping control one (representing the start pin) or control three (destination pin), both of which are 2DOF controls, they can position the selected pin on the map, while their hand movement is being mapped to the pin. When both pins are set, the navigation route can be determined and with control two (1DOF), they can list between alternative routes by moving their hand up or down.
- Route time-travel (2 controls): Users can look into the future of a simulated trip by grasping control two (1DOF) and by moving their hand forward or backward. While moving, a displayed 360° street-view navigation application, starts scrolling on the timeline of the route. Users can grasp control one (2DOF), and move their hand to pan the displayed view accordingly. By that, users can explore neighborhoods or points of interest on the route.
- Car's "home" *drawer* (4 controls): Users can use each control for adjusting the most used functions of a simulated car infotainment system. The first control represents the media player (2DOF), by which they can adjust the volume or changes the song, the second control represents air conditioning (2DOF) by which they can adjust the temperature or ventilation intensity, the third controls represents seat adjustment (2DOF), by which they can adjust the seat (up/down, forward/backward) and the forth controls turns the reading light on or off (0DOF - Switch).

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