

# Speech-Filtered Bubble Ray: Improving Target Acquisition on Display Walls

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## Abstract

This video illustrates the speech-filtered bubble ray, a technique that allows people interact with large interactive display walls at a distance. It also contrasts this technique to ray-casting and bubble cursors. To explain, the basic method for target acquisition is by *ray casting* a cursor from one's pointing finger or hand position; the problem is that selection is slow and error-prone with small targets. A better method is the *bubble cursor* that resizes the cursor's activation area to effectively enlarge the target size. The catch is that this technique's effectiveness depends on the proximity of surrounding targets: while beneficial in sparse spaces, it is less so when targets are densely packed together. Our method is the *speech-filtered bubble ray* that uses speech to transform a dense target space into a sparse one. Our strategy builds on what people already do: people pointing to distant objects in a physical workspace typically disambiguate their choice through speech. For example, a person could point to a stack of books and say "the green one". Gesture indicates the approximate location for the search, and speech 'filters' unrelated books from the search. Our technique works the same way; a person specifies a property of the desired object, and only the location of objects matching that property trigger the bubble size. In a controlled evaluation, people were faster and preferred using the speech-filtered bubble ray over the standard bubble ray and ray casting approach.

**Keywords:** Large display walls, speech, gestures, speech filtering, multimodal, freehand interaction, pointing.