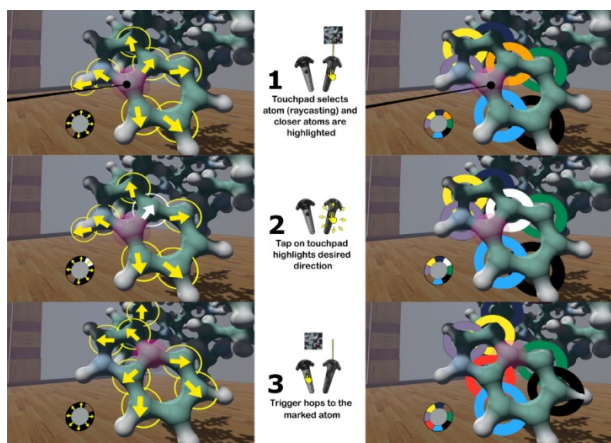


Two-step techniques for accurate selection of small elements in VR environments

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One of the key interactions in 3D environments is target acquisition, which can be challenging when targets are small or in cluttered scenes. Here, incorrect elements may be selected, leading to frustration and wasted time. The accuracy is further hindered by the physical act of selection itself, typically involving pressing a button. This action reduces stability, increasing the likelihood of erroneous target acquisition. We focused on molecular visualization and on the challenge of selecting atoms, rendered as small spheres. We present two techniques that improve upon previous progressive selection techniques. They

facilitate the acquisition of neighbors after an initial selection, providing a more comfortable experience compared to using classical ray-based selection, particularly with occluded elements. We conducted a pilot study followed by two formal user studies. The results indicated that our approaches were highly appreciated by the participants. These techniques could be suitable for other crowded environments as well.