In virtual reality systems, virtual objects and scenes have so far been created manually, or semi-automatically, by a variety of computer graphics utility software. This approach, however, is time consuming and demanding.

In this alternative approach, the system allows users to create different colors and shapes of virtual objects in 3D spaces by direct manipulation. It is based on a proprietary, multiple-camera-based hand posture estimation method, in which palm poses are estimated from multiple-camera images by a statistical approach regardless of finger bending. Then, hand gestures associated with commands for direct manipulation are recognized by verifying the finger bending.

With this system, participants create virtual 3D scenes by giving predefined commands with their own hands, to which no sensing devices are attached. Since the virtual scenes are displayed on a 3D display, participants feel as though the virtual scenes are real 3D spaces, even though they are not encumbered by technological equipment.

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