Patent: Single Hand grasping Gestures and Their Detection Method for Hand Gesture Interaction

Descriptions

This innovation disclosures a method that is capable of enhancing the flexibility of hand gesture interaction in camera-based virtual environment applications, such as virtual reality, augmented reality, and hand gesture control user interface. It recognizes robust and accurate hand kinematics under certain hand postures. With these postures, an object in virtual space can be fully controlled (translation and rotation) by a single hand. The method extracts hand kinematic parameters that describes single hand grasping-moving-rotating activity that is typically used to control software user interface and objects in virtual environment.

Holding an object and moving it with single hand is a common activity in daily life. Clenching fingers together to form a fist is a natural gesture, which represents grasping [1]. The ability to map this activity in designing interactions that allow inputs for software applications can be very useful. However, the processing of images of hand fist and characterization of the various motions as input to computer is not straightforward. We term this motion behavior as single hand grasping-moving-rotating (SH-GMR). These three actions always occur simultaneously. The detection of moving, or simple translation, is fairly easy, attested by the fact that a variety of algorithms already exist [2]. However, the detecting and tracking on fist rotation has been lacking for a long time. The existing compromised solution of rotating a virtual object is to make use of two hands to decide the rotation angle, which includes rotation about an axis as in "steering wheel" rotation [3]. Figure 1 shows our virtual reality environment that uses the existing two-hand gesture to rotate an object. The drawback is obvious - two hands have to be used to grasp the same object simultaneously. Not only it is awkward, but also it prevents user from handling two objects at the same time, as often is the case in the real world. Clearly, the single hand rotation is better than the two-hand rotation approach. Thus, there is a need to achieve SH-GMR.

- Capability 1: single hand grasping-moving-rotating (SH-GMR);
  - Capability 2: two objects can be fully controlled by user's left and right hands.
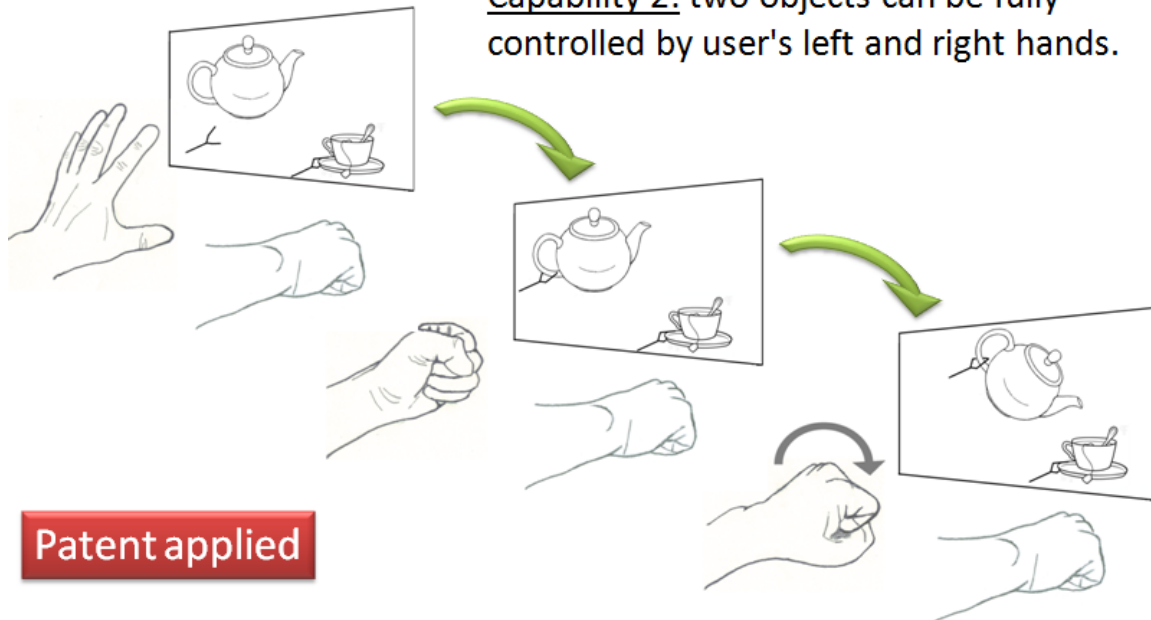
Patent applied

Figure. illustration of the single hand grasping-moving-rotating activity.

Potential Applications

1. Gesture Control TV

2. Gesture Control Smart Phone/Tablet

3. Gesture Control User Interface for Computer

4. Gesture Control for Gaming Application

5. Gesture Control for Virtual Reality