# Electromechanical Passive/Active Parallel/Spherical Haptic Device

This is a novel design of a user-interface device that enables interaction with a 3D mechanics-based graphical environment. The current prototype allows for the natural motions of the input device about a pivot point, and provides force feedback along all the degrees of freedom. The weight of the floating mechanisms and the components of the user-interface reaction force component are supported through a passive joint. The current design also allows for two-handed operation, which results in a total of eight haptic degrees of freedom. The design can easily be extended to support force feedback along six degrees of freedom.

Figure 1: An embodiment of the invention, showing a two-handed operation system with eight haptic degrees of freedom.

## The Need

Current commercial products have limitations in terms of feedback from the haptic device to the user; manufacturing is costly and time-consuming; actuation is not realistic enough for a training environment; and the devices currently on the market cannot easily be altered to produce additional properties.

## Advantages

• High-performance mechanism with four degrees of freedom, capable of force feedback along all degrees;
• The reaction to the user-interface force components are supported passively, hence sig- nificantly increasing durability of the mechanism and fidelity of the haptic feedback;
• A freedom-to-operate IP search has been con- ducted with positive results;
• Extension of the device to a full six degrees of freedom haptic device can be accomplished with minimum assembly.

## Applications

Primarily designed for simulation applications, technology can also be used for other applications that require visual and tactile feedback.

## Intellectual Property Status

PCT application filed by Payandeh et al., 2006.

## Stage of Development

A four degrees of freedom, proof-of-concept device has been developed and tested. A second-generation, six degrees of freedom device is under development.

## Partnering Opportunity

Available for co-development or licensing (exclu- sive or non-exclusive) by jurisdiction and/or field of use.

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