

A Hand Gesture Interface for Investigating Real-time Human-Computer Interaction

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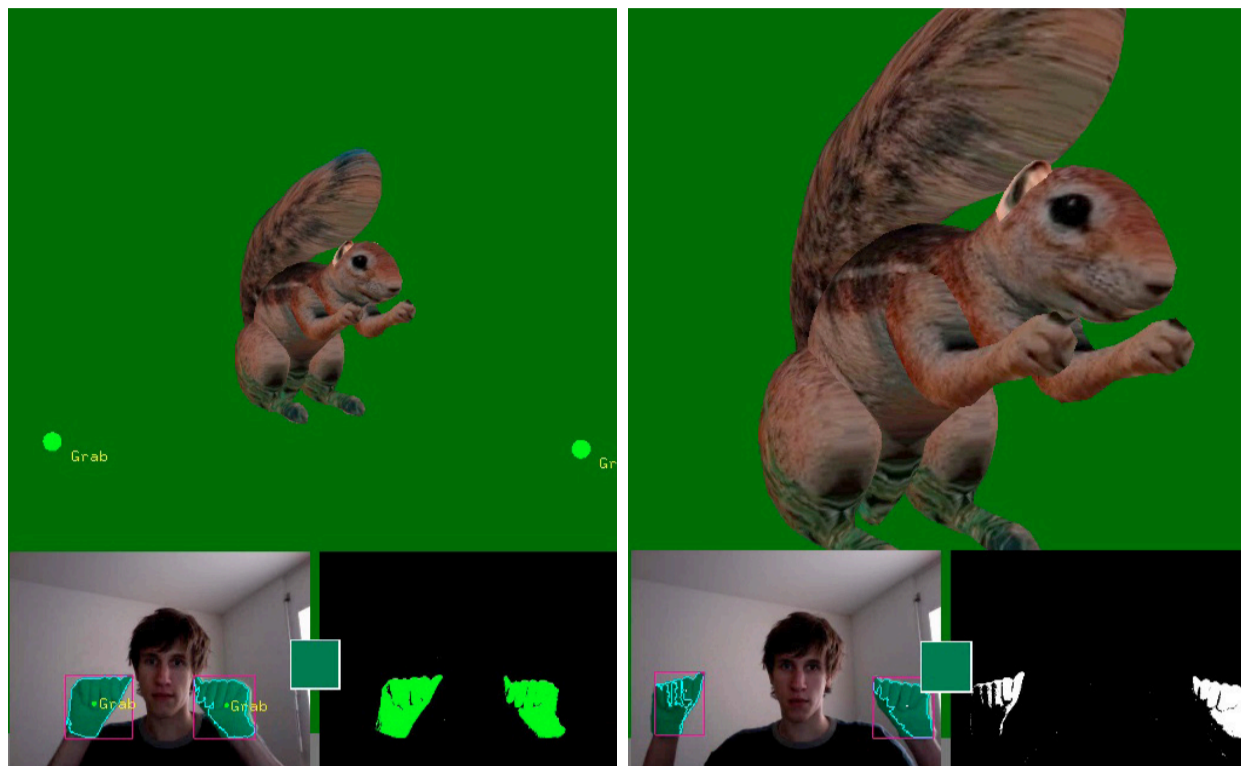


Figure 1: Vision-based interaction with a 3D model in real-time using hand gestures. The user performs a grab gesture with both hands and scales the object by moving them away from each other.

BACKGROUND

Vision-based human motion analysis systems used for HCI can use different recognition approaches. Appearance-based methods [1] require training e.g., with machine learning, probabilistic approaches, etc. and often are robust only under constrained situations. These could be considered to be lacking in the generality desirable for HCI [2]. The only technology that satisfies the advanced requirements of HCI is glove-based sensing [3] which is more accurate but also requires calibration and places restrictions on clothing.

GESTURE LIBRARY

The system developed uses the open source computer vision library OpenCV for contour detection. It distinguishes between atomic gestures, those that are performed using one hand, and combined gestures that use both hands (see Figure 2). This categorisation allows to assign action types using different combinations of gestures, and to have access to a larger action space.

DEMO APPLICATION

The demo application is a basic 3D model viewer (see Figure 3). It uses the atomic and combined gestures to enable navigation between two modes of manipulation; rotation and scale mode. In rotation mode, the user can rotate the model around its X and Y axes by simple grab and release gestures. In scale mode, the user grabs with both hands to start scaling the model as shown in Figure 1.

REFERENCES

- [1] A. Jaimes and N. Sebe. Multimodal human computer interaction: A survey. *Computer Vision and Image Understanding*, 108(1-2):116–134, Aug 2005.
- [2] V. I. Pavlovic, R. Sharma, and T. S. Huang. Visual interpretation of hand gestures for human-computer interaction: A review. *IEEE Trans. Pattern Anal. Mach. Intell.*, 19(7):677–695, 1997.
- [3] A. Erol, G. Bebis, M. Nicolescu, R. D. Boyle, and X. Twombly. Vision-based hand pose estimation: A review. *ScienceDirect*, pages 1–22, Aug 2007.

ABSTRACT

Hand gestures would seem to offer a natural and efficient way of interacting during a variety of human-computer interaction (HCI) tasks. This poster describes the development of a light-weight, portable hand gesture system. The user wears coloured gloves to facilitate hand recognition, enabling the system to run in real-time and utilise a standard web camera for input. The system is developed in order to investigate and compare such interfaces with conventional types for a variety of tasks, particularly in how they may be combined and used in conjunction with standard interfaces.

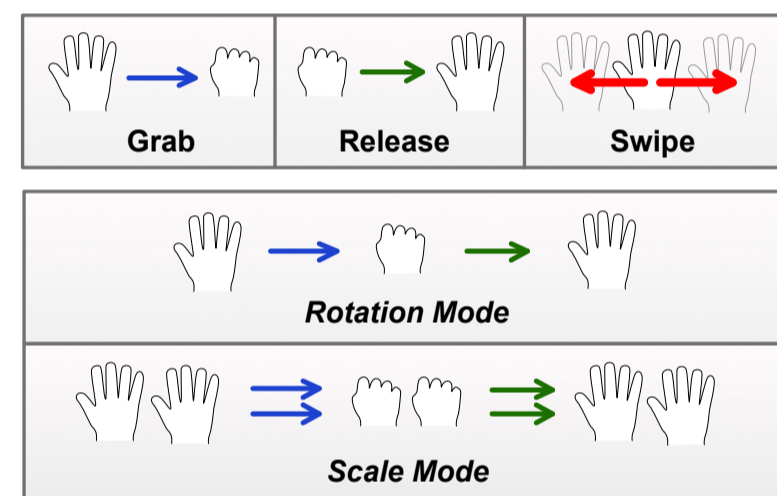


Figure 2: Overview of single-handed gestures (top) and the two different modes of manipulation used in the demo application.

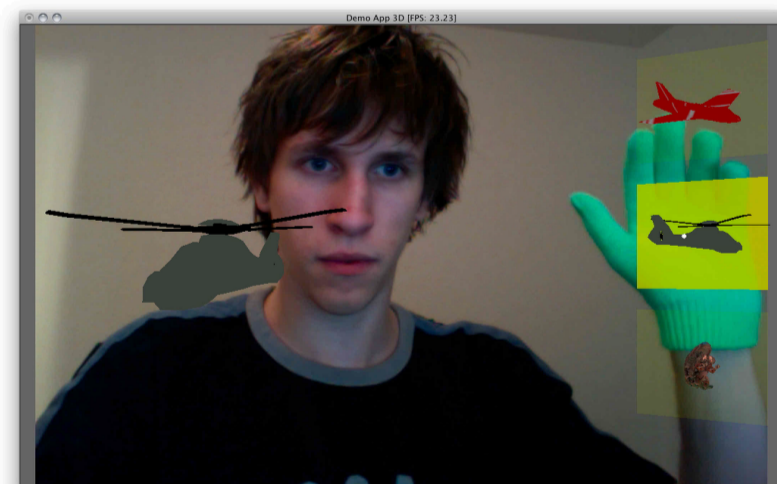


Figure 3: Demo application enabling users to interact with several 3D objects using only their hands.

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