

A low cost optical tool for a 3D markerless motion capture

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A markerless motion capture technique is described for reconstructing three-dimensional biological motion.

The process is composed by several stages. At first, an action is recorded with 2 CCD webcams. Second, the movie is divided in frames. For each frame, the 2D coordinates of key locations (body joints) are extracted by the combination of manual identification (mouse pointing) and image processing (blobs matching). Finally, an algorithm computes the X-Y coordinates from each camera view to write a file containing the 3D coordinates of every visible point in the display.

This technique has many advantages over other methods. It doesn't require too specialized equipment. The computer programming uses open source software. The technology is based on an inexpensive portable device. Lastly, but not least, it can be used for different environments and living beings (humans or animals).

By developing a low-cost and portable system, this technology has already been tested in a wide range of applications. Avatars, like point-light walkers, have been created for psychophysical studies. Since the recording is stereoscopic, it can be used in a clinical context for a deeper three-dimensional analysis of the motion (e.g., comparison of movement smoothness before and after a cerebral surgery or medication in parkinsonic patients).