Optical Markerless Motion Capture

V3C

We present a portable motion capture system which allows to perform real-time MoCap at arbitrary locations without any special restrictions such as controlled background, special clothing, or retro-reflective markers. As compared to other professional MoCap systems such as Vicon our hardware device is inexpensive consisting of 6 off-the-shelf optical USB cameras mounted on microphone stands connected to PC via active USB cables. The whole setup is easy to build and calibrate. It does not require any special illumination such as infrared or structured light and can eventually be used also in outdoor environments. Our solution is suitable for applications where ease of setup predominates accuracy, i.e., pre-visualization or 3D motion reference for layout.

Figure 1: Example setup of our markerless MoCap system built at the lab of the Institute of Intermedia (CTU in Prague).

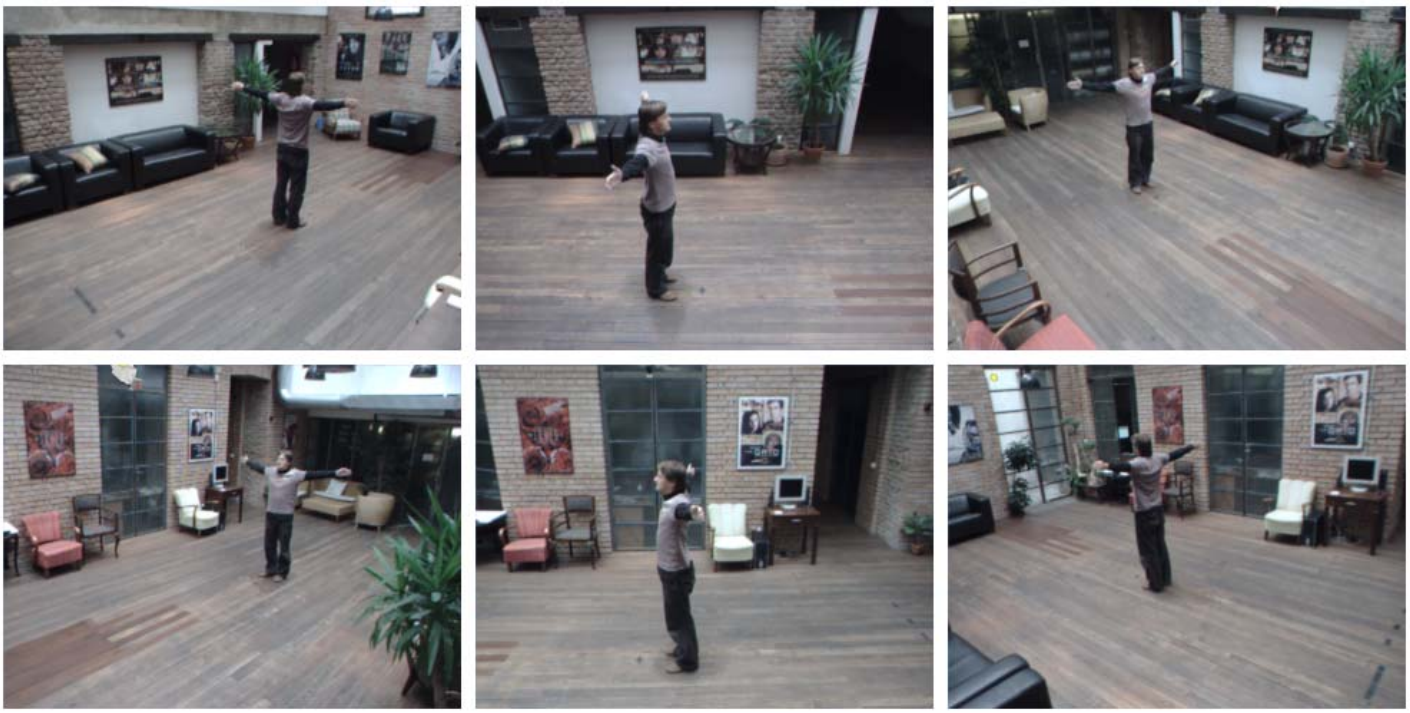

Figure 2: Six views captured from cameras of our makerless MoCap system built at the facility of UPP studio in Prague. Not that no special background or clothing is necessary to perform motion capture.

Applications

Our system builds upon state-of-the-in art in markerless motion capture (Stoll et al. 2011). To model actor's poses the system uses sum of colored 3D blobs attached to standard kinematic skeleton (see Figure 3). The aim of the system is to maximize overlap between image pixels and 2D projections of model blobs in each viewpoint. A key advantage here is that the color information and background subtraction is used to increases robustness of the whole system. Thanks to this improvement the system enables to perform reasonably accurate motion capture even with casual clothing or cluttered background (see Figure 2 and 3). Tracking of multiple actors is also possible (see Figure 4). In this case blob masking mechanism is used to avoid actors' interference.

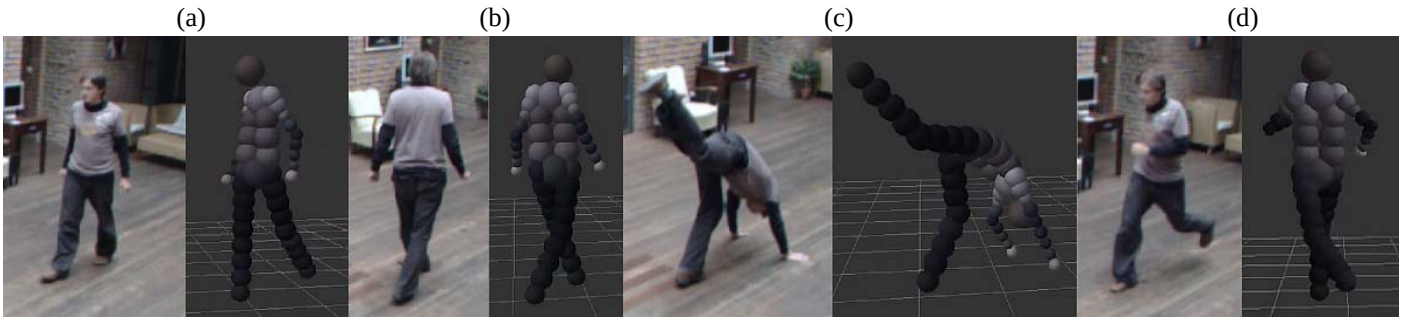

Figure 3: Examples of poses tracked fully automatically using our markerless MoCap system built at the facility of UPP studio. Note how even complex poses such as leg crossing (b), beginning of handstand (c) or fast motions such as running (d) were captured correctly.

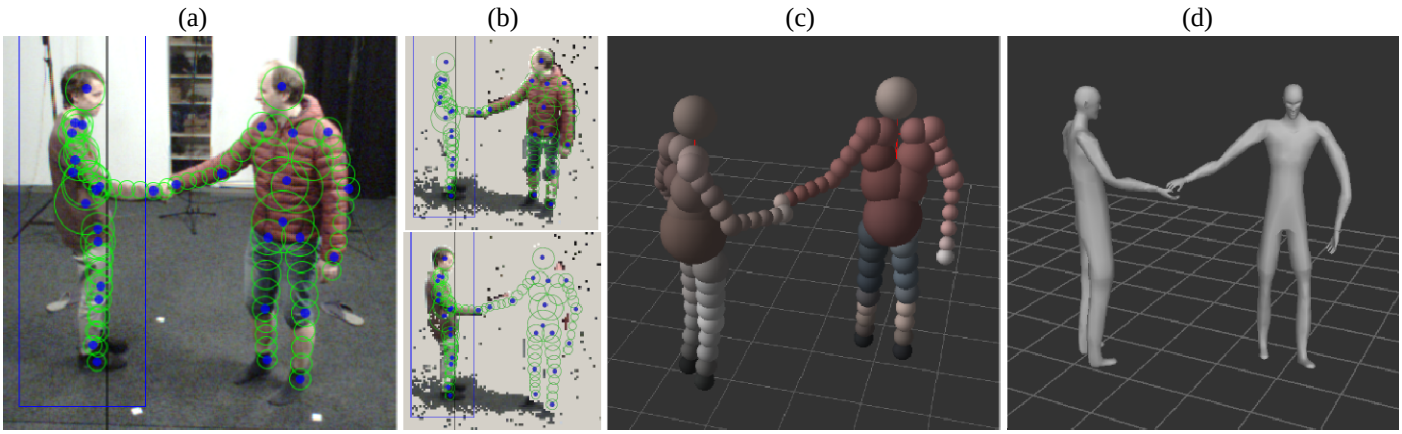

Figure 4: Example of interaction of two persons (handshake): (a) view captured from one of the six cameras with superimposed actor models, (b) visualization of image blob masking mechanism used to avoid confusion between individual actors, (c) resulting 3D skeleton poses visualized as a set of spheres, (d) poses retargeting on generic 3D meshes.

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