

## MOTION CAPTURE

O.A.Koloskova – Sumy State University, group EL-11

A.M.Dyadechko – E L Adviser

Motion capture, motion tracking, or mocap are terms used to describe the process of recording [movement](#) of one or more objects or persons. It is used in [military](#), [entertainment](#), [sports](#), and medical applications

[Video games](#) often use motion capture to make in-game characters. Movies use motion capture for CG effects and for completely [computer-generated](#) creatures, such as [Gollum](#), [The Mummy](#), [King Kong](#), [Davy Jones](#) from Pirates of the Caribbean, the Na'vi from the film [Avatar](#).

[Sinbad: Beyond the Veil of Mists](#) was the first movie made primarily with motion capture, although many character animators also worked on the film.

Mocap is used in producing films which look like live-action cinema. [The Polar Express](#) used motion capture to allow [Tom Hanks](#) to perform as several distinct digital characters. The characters whose appearances are based on the actors who provided their motions and voices can be created.

During the filming of James Cameron's [Avatar](#) all of the scenes involving this process were directed in realtime using Autodesk Motion Builder software to render a screen image which allowed the director and the actor to see what they would look like in the movie, making it easier to direct the movie as it would be seen by the viewer.

[Gait analysis](#) is the major application of motion capture in [clinical medicine](#). Techniques allow clinicians to evaluate human motion across several biometric factors, often while streaming this information live into analytical software.

Motion tracking or motion capture started in biomechanics research in the 1970s and 1980s. A performer wears markers near each joint to identify the motion by the positions or angles between the markers.

There are 2 types of mocap: technology with the use of markers and markerless.

Optical systems utilize data captured from image sensors to [triangulate](#) the 3D position of a subject between one or more cameras calibrated to provide overlapping projections. Passive optical system use markers coated with a [reflective](#) material to reflect light that is generated near the camera's lens. The camera's threshold can be adjusted so only the bright reflective markers will be sampled, ignoring skin and fabric. Typically a system will consist of around 2 to 48 cameras. Extra cameras are required for full coverage around the capture subject and multiple subjects. The difference between active and passive markers is that active markers themselves are powered to emit their own light.

Mechanical motion: performers attach the skeletal-like structure to their body and as they move so do the articulated mechanical parts, measuring the performer's relative motion.

There are other types of mocap technology: magnetic systems, inertial systems and some other.

Markerless systems do not require subjects to wear special equipment for tracking. Special computer algorithms are designed to allow the system to analyze multiple streams of optical input and identify human forms, breaking them down into constituent parts for tracking.

Mocap is widely spread in filmmaking, computer animation and medicine. Without this technology the process of creating computer characters would be much more difficult.