Motion capture offers several advantages over traditional [computer animation](https://en.wikipedia.org/wiki/Computer_animation) of a 3D model:

* Low latency, close to real time, results can be obtained. In entertainment applications this can reduce the costs of keyframe-based [animation](https://en.wikipedia.org/wiki/Animation). The [Hand Over](https://en.wikipedia.org/wiki/Hand_Over) technique is an example of this.
* The amount of work does not vary with the complexity or length of the performance to the same degree as when using traditional techniques. This allows many tests to be done with different styles or deliveries, giving a different personality only limited by the talent of the actor.
* Complex movement and realistic physical interactions such as secondary motions, weight and exchange of forces can be easily recreated in a physically accurate manner.[[7]](https://en.wikipedia.org/wiki/Motion_capture#cite_note-7)
* The amount of animation data that can be produced within a given time is extremely large when compared to traditional animation techniques. This contributes to both cost effectiveness and meeting production deadlines.[[8]](https://en.wikipedia.org/wiki/Motion_capture#cite_note-8)
* Potential for free software and third party solutions reducing its costs.
* **Disadvantages**
* Specific hardware and special software programs are required to obtain and process the data.
* The cost of the software, equipment and personnel required can be prohibitive for small productions.
* The capture system may have specific requirements for the space it is operated in, depending on camera field of view or magnetic distortion.
* When problems occur, it is easier to reshoot the scene rather than trying to manipulate the data. Only a few systems allow real time viewing of the data to decide if the take needs to be redone.
* The initial results are limited to what can be performed within the capture volume without extra editing of the data.
* Movement that does not follow the laws of physics cannot be captured.
* Traditional animation techniques, such as added emphasis on anticipation and follow through, secondary motion or manipulating the shape of the character, as with [squash and stretch](https://en.wikipedia.org/wiki/Squash_and_stretch) animation techniques, must be added later.
* If the computer model has different proportions from the capture subject, artifacts may occur. For example, if a cartoon character has large, oversized hands, these may intersect the character's body if the human performer is not careful with their physical motion.

## Methods and systems



Reflective markers attached to skin to identify bony landmarks and the 3D motion of body segments



Silhouette tracking

Motion tracking or motion capture started as a photogrammetric analysis tool in biomechanics research in the 1970s and 1980s, and expanded into education, training, sports and recently [computer animation](https://en.wikipedia.org/wiki/Computer_animation) for [television](https://en.wikipedia.org/wiki/Television), [cinema](https://en.wikipedia.org/wiki/Film), and [video games](https://en.wikipedia.org/wiki/Video_game) as the technology matured. Since the 20th century the performer has to wear markers near each joint to identify the motion by the positions or angles between the markers. Acoustic, inertial, [LED](https://en.wikipedia.org/wiki/LED), magnetic or reflective markers, or combinations of any of these, are tracked, optimally at least two times the frequency rate of the desired motion. The resolution of the system is important in both the spatial resolution and temporal resolution as motion blur causes almost the same problems as low resolution. Since the beginning of the 21st century and because of the rapid growth of technology new methods were developed. Most modern systems can extract the silhouette of the performer from the background. Afterwards all joint angles are calculated by fitting in a mathematic model into the silhouette. For movements you can't see a change of the silhouette, there are hybrid Systems available who can do both (marker and silhouette), but with less marker.

# **Introduction**

Motion Tracking is used to track the motion of objects and applying that data to 3D object through the compositor. Blender’s motion tracker supports a couple of very powerful tools for 2D tracking and 3D motion tracking, including camera tracking and object tracking, as well as some special features like the plane track for compositing. Tracks can also be used to move and deform masks for rotoscoping in the Mask Editor, which is available as a special mode in the Movie Clip Editor.

## Views

In Tracking Mode there are three different views available. You can toggle between view modes using the View menu, which is located in the header. When you selected a view in the whole area of the Movie Clip editor will change. Hence, to display a curve or dope sheet view, the editor must be split into two, with one switched to the curve or dope sheet view.

## Manual Lens Calibration

All cameras record distorted video. Nothing can be done about this because of the manner in which optical lenses work. For accurate camera motion, the exact value of the focal length and the “strength” of distortion are needed.

Currently, focal length can be automatically obtained only from the camera’s settings or from the EXIF information. There are some tools which can help to find approximate values to compensate for distortion. There are also fully manual tools where you can use a grid which is getting affected by distortion model and deformed cells defines straight lines in the footage.

You can also use the Grease pencil for this – just draw a line which should be straight on the footage using poly line brush and adjust the distortion values to make the Grease pencil match lines on the footage.

To calibrate your camera more accurately, use the Grid calibration tool from OpenCV. OpenCV is using the same distortion model, so it should not be a problem.

## Camera and Object Motion Solving

Blender not only supports the solving of camera motion, including tripod shots, but also the solving of object motion in relation to the motion of the camera. In addition to that there is the Plane Track, which solves the motion of all markers on one plane.

There are also plans to add more tools in the future, for example more automatic tracking and solving, multi-camera solving and constrained solutions.

## Tools for Scene Orientation and Stabilization

After solve, you need to orient the real scene in the 3D scene for more convenient compositing. There are tools to define the floor, the scene origin, and the X/Y axes to perform scene orientation.

Sometimes, the video footage includes spurious jumps and tilting movements, like e.g. when using a hand held camera. Based on some tracked image elements, the [2D Stabilization](https://docs.blender.org/manual/en/dev/editors/movie_clip_editor/tracking/clip/properties/stabilization/index.html) is able to detect and compensate such movements to improve the quality of the final result.