



TRACKER

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Abstract



Tracker is a software program used to track the movements of objects and translates the motion of the objects into graphs of position, velocity, acceleration, etc. A lot of problems, especially those ones involving motions, will very likely require tracker graphs for analysis. Below gives simplified instructions for how to use a tracker as a beginner.

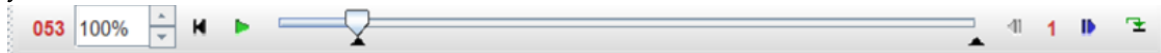





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1 Content

1. Click on File → Open File to open the video. The video should be loaded onto the tracker.
2. Calibrate video. Make some markings when taking the video so you know the scale (does 1cm in the video represent 1dm or 1m in real life? Or does it represent 0.5m?) Without calibration, the tracker automatically assumes a scale, and although you still get the graphic shapes correct, the increments on the x and y axes will be messed up. To calibrate, click on  → New, and create a calibration stick. Using shift-click to mark the two ends of the calibration stick and fill in the value of the length of calibration stick represents (1dm, 1m, or 0.5m). The calibration stick can also be adjusted.
3. To graph the movements of the object, set up a coordinate system first. Click  and you will see the axes appearing on your screen. Drag the origin of the axis to the point where all measurements are based on. For example, to graph the movement of a ball rolling and falling off a table, set the bottom of the table as the origin and compare the ball's relative position to the origin both horizontally and vertically. To do angle tracking, the origin is also where the angles are based on.
4. Now that you've set up your axis, find the portion of the video to be tracked. For a longer video, it is quite possible that the frame number goes up to more than 3000. Use the bar at the bottom and drag the black triangles to set the range of frames you want your tracker to track.



5. Set up your object to be tracked. Click  Create and point mass. Shift-click on the ball, and your object will be marked. Notice that the point mass you are tracking must be sufficiently different in colour compared with the background. For example, when you do the experiments, use a white ball with black background for easy tracking. Although point mass is the most common object used for tracking, you can also explore “centre of mass”, “dynamic model”, etc.
6. After setting up your object, there are two options. Option 1: track the object manually. Say you set up a point mass A in frame 10, you would have to shift-click to define point mass A in frame 11, 12, 13, 14... Say you want to track your object to the 200th frame, that will probably exhaust you to frustration. However, tracking manually is not impossible, and sometimes when the motion of an object is a bit unpredictable/ jerky, you actually need to manually track for some of the frames to keep the result more accurate.
7. Most of the time though, use an auto-tracker. Click on  on the top bar. A window will pop up. At the bottom, select the object you want to auto track (a point mass that you have already defined). Then use shift-control-click to click on the position of the point mass in the current frame. After you select the point mass to be auto tracked, the tracker will track the point mass based on the template colour of the point you clicked.
8. After clicking a point mass in the video frame for auto-track, you see a square encompassing the point you click. This square is the range the tracker tracks.
9. Click on the Pause/ Play button  at the bottom of the tracker, you are now tracking the motion! In cases when there is a frame in which the tracker cannot find a matching

point, the tracker will ask you, “is this error acceptable based on the matching score?” And you can see what’s happening/ where you need manual track.

10. You should see the graph being produced on the right as the video plays. You can select the object you are interested in and get data from the table below. You can also click on the x and y axes to change the variables, such as from position to velocity to acceleration (y-axis).

