

Tracker

Summary

Short Description: Freeware to digital video analysis and modelling

Language: English and other languages

Suitable for age: 15-18 years

Key words: Physics, mathematics, modelling, digital video analysis, DVA

Format: .doc

Link: https://physlets.org/tracker/

Instructions

1. Download and install Tracker from https://physlets.org/tracker/



Tracker is a free software for digital video analysis and modelling, designed for teaching Physics, but it can be used in an exploratory way in other areas, such as Mathematics and Chemistry. It is an intuitive, simple-to-use tool and an important lever for exploratory and interdisciplinary analysis, bringing concepts closer to the physical realities of our daily lives. Basically, Tracker allows you to transform a video into a table of data relating to

position and time, with which the most varied graphs are defined and the most diverse situations are configured through mathematical modelling. In this way, the movement of an object will be monitored in a given reference and scale, established by the user, thus



allowing to follow, frame by frame, the development of the movement in the video and simultaneously in the different graphic representations defined by the user. It also allows adjusting the graphical representations to the functions that determine them, thus obtaining the respective algebraic expressions, which basically translate the kinematics and dynamics equations for each situation. This will allow you to create bridges between the phenomenon and its representation, a fundamental aspect for understanding Physics and Mathematics.



Working Area

The video control



Load the vídeo using File -> Import ->Vídeo... or Vídeo \rightarrow Import or using tools. After you must define the video portion to be analized usind marks **3** and **4** of video control.

Now, you must define the **referential** (+) and the **spacial scale** ($\frac{1}{2}$ calibration stick).

It's time to define your object on the vídeo using Track -> Point Mass. You can define color, name and several parameters of your object. After, go to the beginning of the video portion choosed and, with just a right click of the mouse on the center of your chosen object, and will appear a mark on it. Also it will appear a mark on a graph and data on data table. The movie will move to the next frame for a new mark, and so on.





The "Diagram" button, at the top of the graphics window, allows us to define, from 1 to 3,

the number of simultaneous graphic representations that we can observe. In any of the graphs, clicking on the variable of any of the axes, we can choose a new variable among those presented, or even define new variables resulting from the application of mathematical expressions on the data of the problem.

To now proceed to the analysis of the graphs, just choose the desired graph and, on it, click with the right mouse button, opening a box of options, from which we highlight the option "**Analyze...**". This option will open the "**Data Tool**", a new graphical analysis tool that will allow us to explore more broadly the data obtained from the previous process.

Examples of this are the determination of the derivative at the point which, in the case of the present image, corresponds to the algebraic value of the instantaneous vertical velocity, or measuring the



area defined in the interval, which can be of great interest particularly in graphs v=f(t).

Thus, by analyzing the graph, this tool can give us the values of the line, parabola or other function, which best fit the data obtained. We can thus make an exploratory analysis of both mathematics and also obtain from here the parameters of the kinematic equations relating



to the movement studied here.



To understand better how to use this fantastic tool, you can explore the video about this case (it is in portuguese but you may translate automatically in youtube settings): <u>https://youtu.be/uCbw8K_oPjc</u>

You may also watch the video of the author of Tracker:<u>https://www.youtube.com/watch?v=La3H7JywgX0</u>

