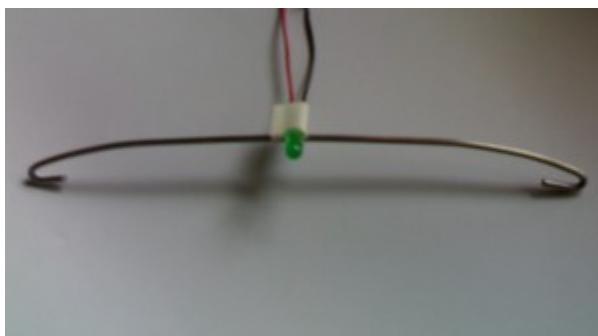




# Handbook V2.1



October 2007 by *Babasiar*.  
Helped by *The\_target* - *Kestrel*.  
Version 2.1 (English)  
Translated by *Tristan68*.

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## Introduction

*FreeTrack* is a software used to simulate head movements in your games, to increase realism and fun.

To achieve this, *FreeTrack* needs a webcam and markers (made of head-fixed diodes).

Thanks to these markers (diodes), *FreeTrack*, detects the player's head movements, and reproduces them ingame.

*FreeTrack* works in the same way than *TrackIR*, and is compatible with most of the games using this technology.

The latest *FreeTrack* version is available at this address :

<http://www.free-track.org>

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## Required Hardware and Software

- Microsoft's Windows XP SP2 or Windows Vista equipped PC.
- DirectX 9.0c installed.
- Processor with SSE2 instruction set (Intel Pentium 4 or equivalent, or better).
- A webcam.
- 1, 3 or 4 Infrared Light Emitting Diodes (Part ref : OSRAM SFH485P or equivalent) or , by default, 1, 3 or 4 standard Light Emitting Diodes.
- A cap (with non-reflecting visor) for 4dots and 3dots cap mode.
- A rigid copper wire (electric wire) 30 cm long, or better : a metal clotheshanger.
- DC power supply low power (500mA or less).
- Electric adhesive tape, for proper insulation.
- Doublesided adhesive tape to fix the diodes on the mounting.
- 1, 3, or 4 current limiting resistors (depends of power supply).
- [optional] An on/off switch.
- [recommended] An IR filter (ie : a piece of negative photograph) to filter out parasit markers.

### Tools

Get a flat nose pliers (to fold the mounting), a cutting pliers (to cut out the clotheshanger or the copper wire), a soldering iron and its lead to connect the diodes.



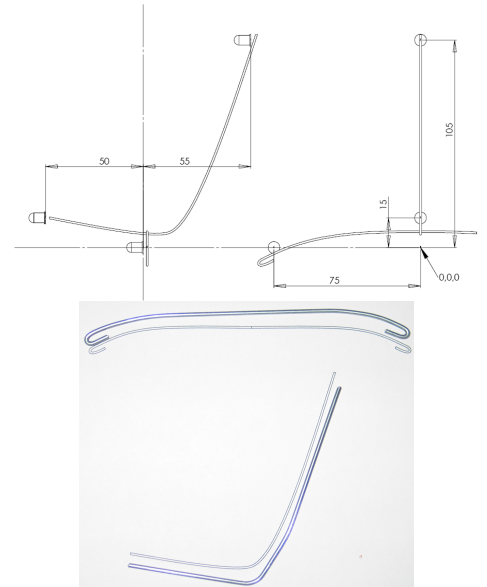
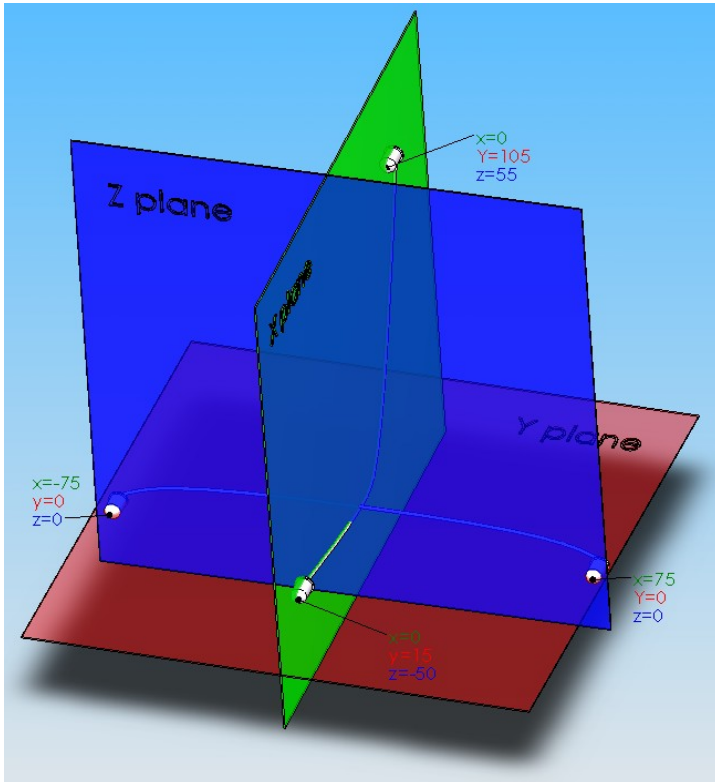
#### **WARNING :**

**The adequate processing of movements collected by FreeTrack depends on the precision and quality of your assembly.**

**Take particularly care of the assembly symetry, as showed on the next section diagrams .**

### Building a 4 Dots Cap, 3 Dots Cap, 3 Dots Clip, Single Dot system

Place components in space like described below : (see [support.pdf](#) 1:1scale for precise building of the 2 rods used to create a **4 Points Cap** model.)

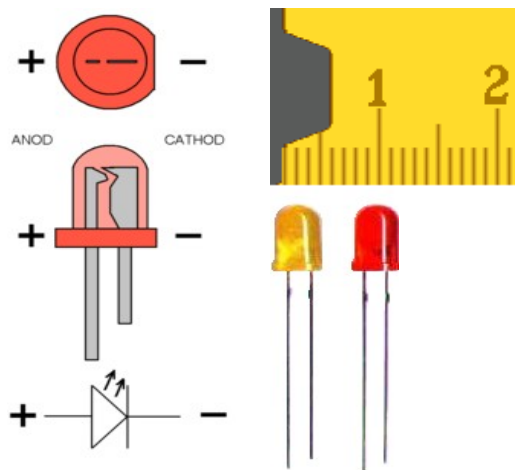
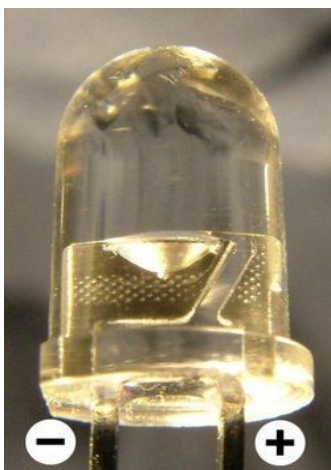


Print [support.pdf](#) on A4 size paper.

Your rods size must meet exactly the drawings size on the printed page.

### LED wiring

Diodes are polarized components. It is necessary to take care of polarity when wiring. To locate the flat part of the diode use the image below:



Diodes examples :

Consult [Tristan68's](#) Led handbook to learn more.

**note :**

The current going through the diodes sets the radiation strength.

The more current, the more light.

Also , the more current , the more dissipated heat, and the less Led lifespan.....

The diodes you should use for this assembly must have a **5mm** diameter (as showed on picture), must be red or orange (These 2 colors are better tracked by *FreeTrack*) and have a wide radiation angle (It's no use to have high power leds, if you can't see them from the side).

If you want to use infrared leds, please use the given model (OSRAM SFH485P) or equivalent.



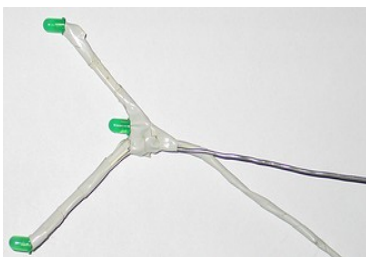
To carry out all calculations necessary to build the system, please click here : <http://www.free-track.org/english/freetrack/calced/>

#### 4 Points Cap assembly example

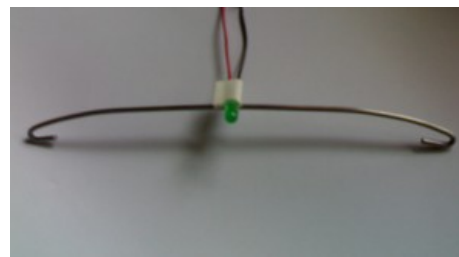


**Warning :**  
Once system is built, check dimensions, and adjust dimensions settings in software if needed.

#### 3 Points assembly example



#### Single Point assembly example



# FreeTrack software installation

Install *Freetrack* in your preferred folder : ie : [C:\Program Files\FreeTrack](#)

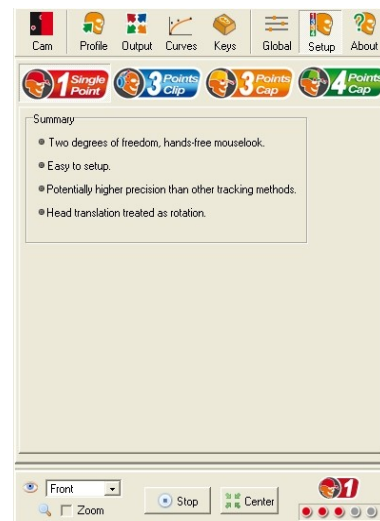
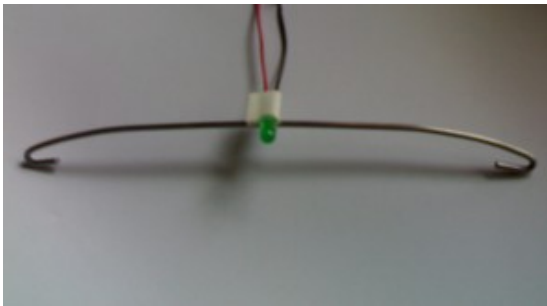
Registry update is done automatically.

According to the chosen model, adjust in **Setup tab** your leds position in space.

When you select a model, a schematic appears on the right side of the *FreeTrack* window.

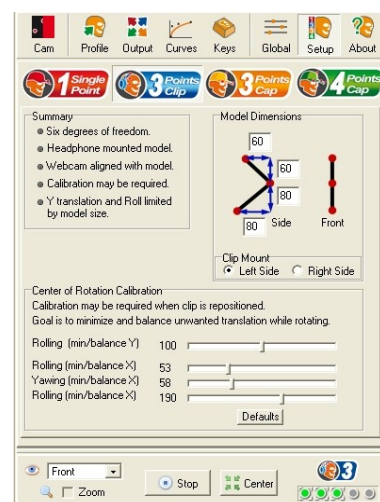
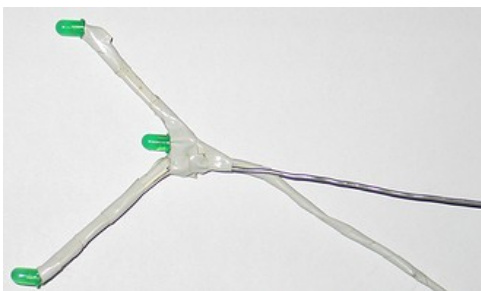
## Single point mode

No setup is needed for Single Point mode.



## 3 points Clip mode

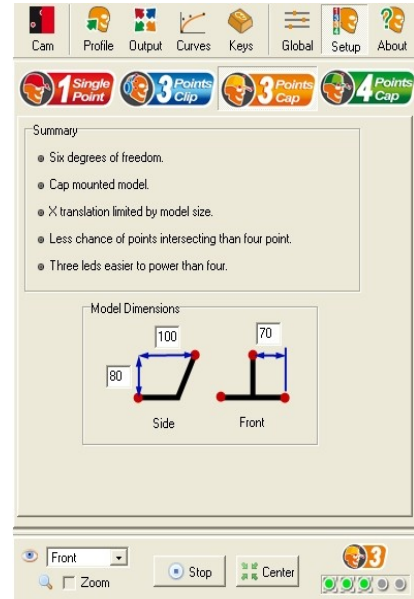
Here are the parameters for 3 Points Clip mode





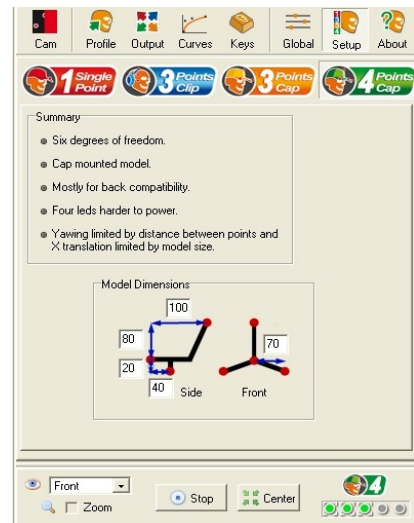
### 3 Points Cap mode

Here are the parameters for 3 Points Cap mode :



### 4 Points Cap mode

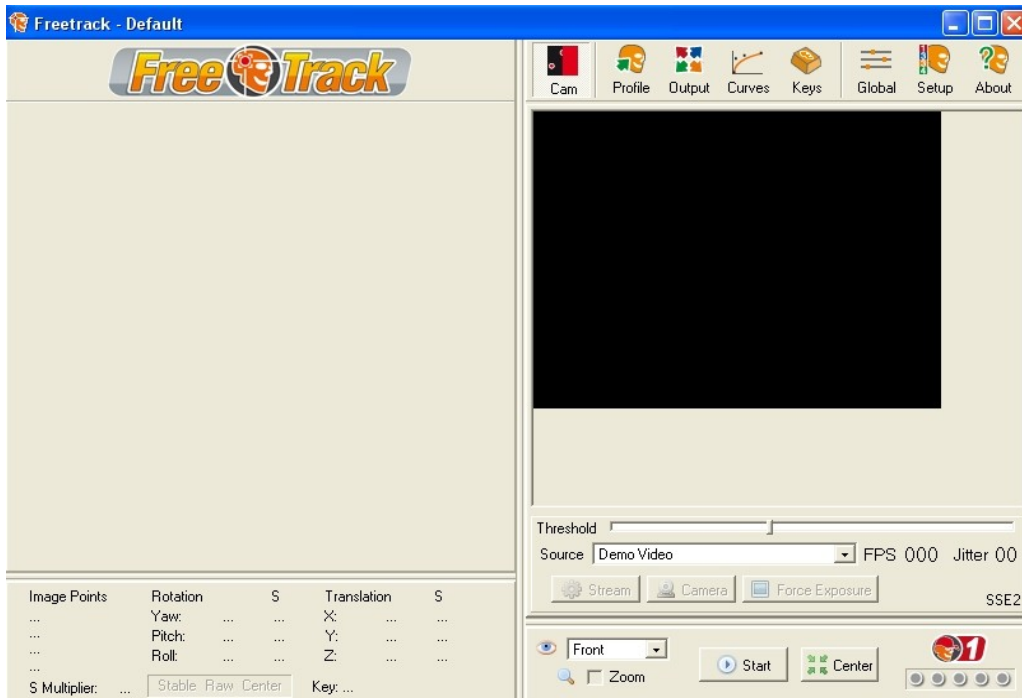
Here are the parameters for 4 Points Cap mode :



## System setup

Execute your first attempts in a darkened room (To reduce light parasites).  
Wear you led cap ☺, switch on and start *FreeTrack*

### Webcam settings



*FreeTrack* uses balloon help to detail the most important functionalities (stay still a few seconds on a function to have more information)

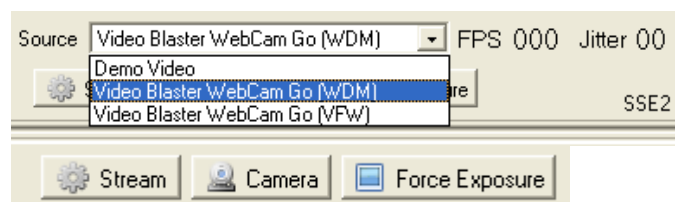
The image filter is automatically chosen, based on your CPU model (SSE2 or MMX). If you further want to alter this setting, you can edit it in the **freetrack.ini** file. (This is normally unnecessary and must only be done in last resort).

Search for this section in **freetrack.ini** :

```
[Camera]
FreetrackFilter=
```

And put **MMX** or **SSE2**

In the interface list, select a webcam.

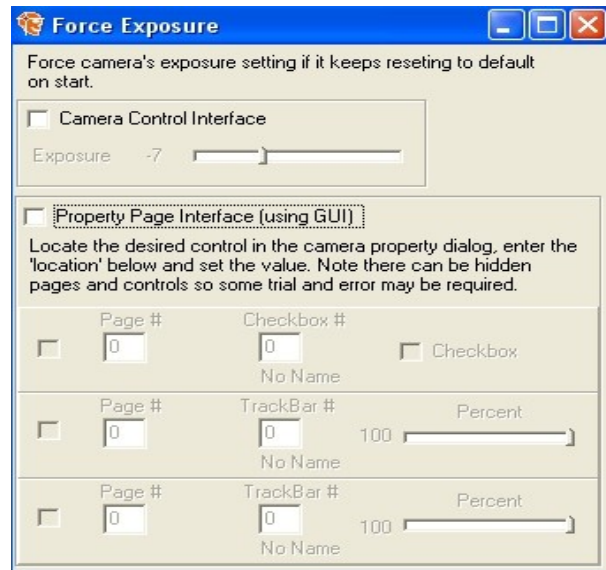


Using these icons, select the webcam resolution, video quality and exposure

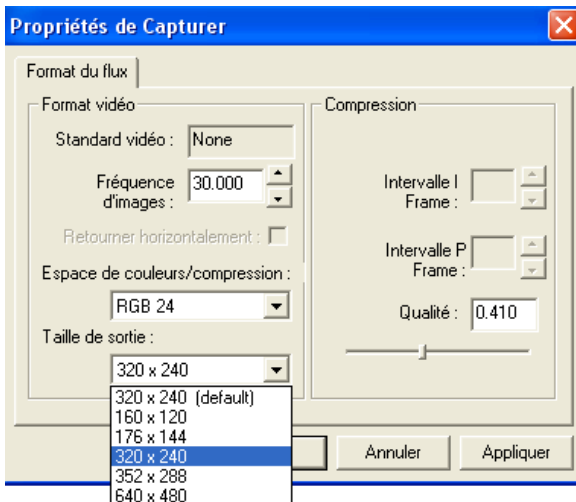
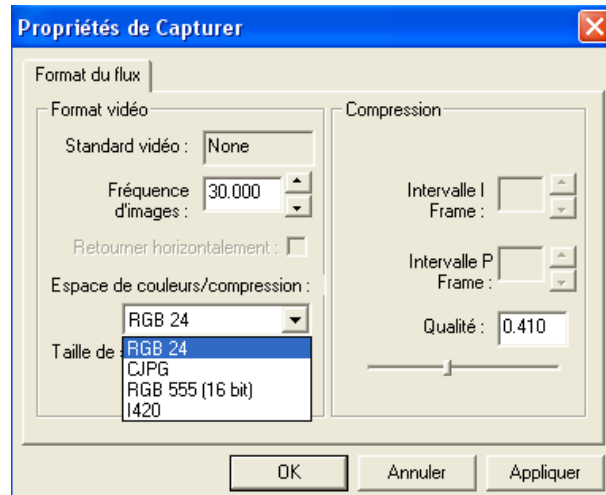
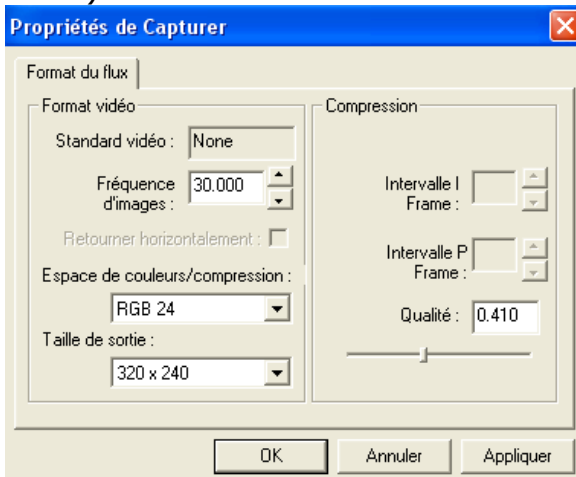
Setup screens are now available (information may differ based on webcam model)



The **Force Exposure** function allows to override your webcam settings if you check the **camera control interface** option



The following windows will show the various available settings (depending of your webcam driver)



You find yourselves in **capture properties** window, where you can select, based on your webcam quality, the images frequency (the more images you can capture, the smoother your movements will be), compression, output size which corresponds to the size of the image in the Cam tab of the capture window. Adjust your parameters to get the best Quality/Output size/Image frequency compromise.



You can also adjust your webcam image setup.

The **camera properties** dialog box appears : Two tabs allow you to modify these properties. For instance, you can adjust the exposure to limit some parasitic lights...



*Nota :* the less image quality, the more images per second.

**Warning :**

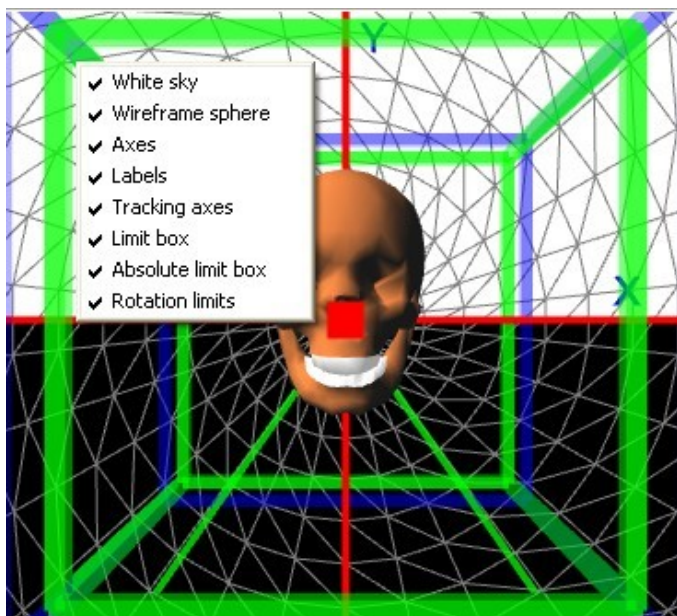
Options shown in Camera properties window may vary from one webcam to another. Some options may be inactive or active, compared to the left side picture.

Once every option has been set, click on **Start**, then **Center** :



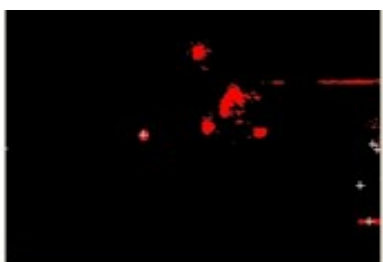
**Capture setup**

By right-clicking on the head display window, you can alter your viewing preferences.



To acquire the markers efficiently, you'll need to adjust the **Threshold** cursor:

Here is an adjusting example, in 4 Points Cap mode (For better understanding, all preview options have been disabled)



Too many visible markers :

**Status : FALSE**

Move **Threshold** cursor to the right.



4 markers seen :

**Status : OK**



Not enough visible markers :

**Status : FALSE**

Move **Threshold** cursor to the left.

Once status is **OK**, you can proceed to sensitivity adjustment.

### Sensitivity adjustment

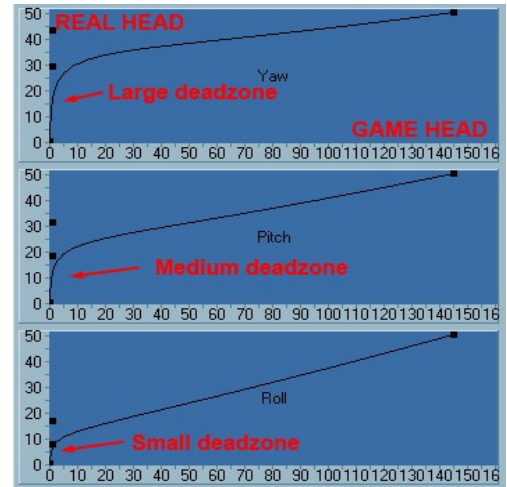
*Principle :*

The vertical axis represents the player's real head movement.  
 The horizontal axis represents the head movement, as reproduced in game.  
 The example profiles allow attenuated movements near center position.

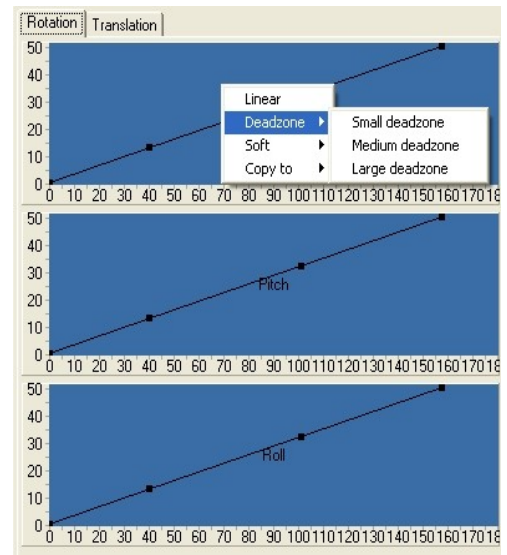
To adjust your head movements in *FreeTrack*, click on **Rot** and **Trans** tab, and modify the 3

curves accordingly.

To adjust the curves, drag the control points as needed.



By right-clicking on a curve, you can quickly alter the curve characteristics.



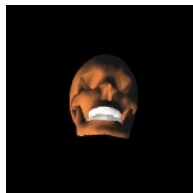
What are these curves meaning ?  
Answer here :

YAW



(Rot left/right)

PITCH

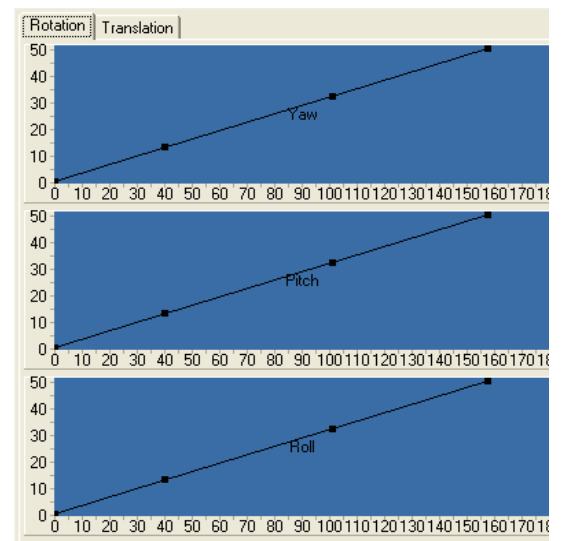


(Rot. up/down)

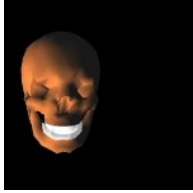
ROLL



(Lean left/right)

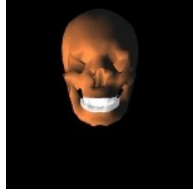


X



(Move left/right)

Y

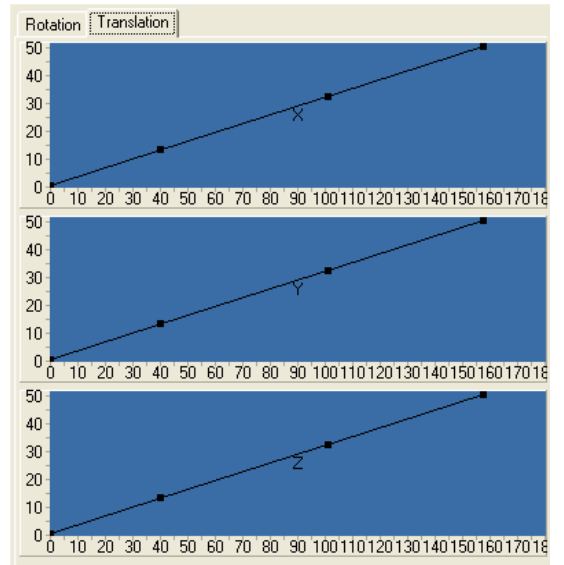


(Move up/down)

Z



(Zoom In/Out)



## Profile management

The **Profile** tab allows to create custom game profiles. IE, if you notice an inverted axis in a game, you can revert it back to normal operation. All you need to do is check the according checkbox in this tab.

You can add, rename or delete profiles by right-clicking in the profile list window.

You can also alter movement sensitivity and deadzone for each axis.

**Average** allows to smoothen movements.

**Dynamic Smoothing Reduction** allows for realtime movement speed smoothing

The remaining functions are used to define output emulation (Trackir native, joystick emulation, mouse emulation).

The **Output** tab is used to choose *Freetrack's* mode :

Native mode : Direct Game Interface

Mouse Emulation : Mouse

Joystick Emulation : Virtual Joystick (PPJoy)

Keyboard Emulation : Keys

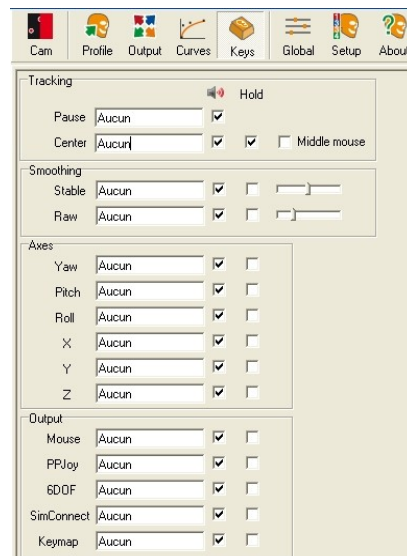
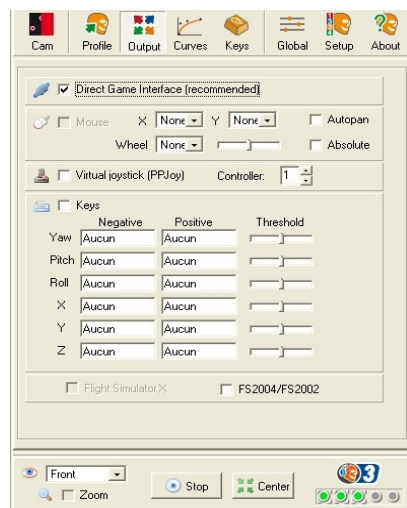
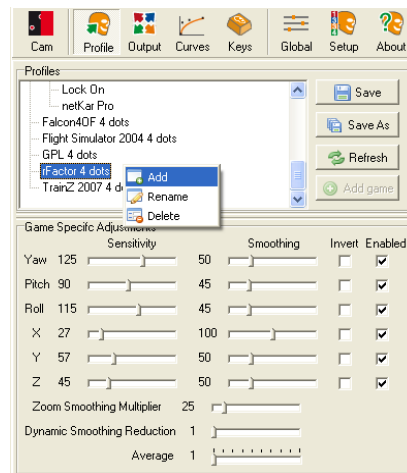
FSX : bridge to simconnect interface

FS2002/2004 : bridge to FSUIPC interface

The **Keys** tab allows to define Hotkeys to dynamically alter *Freetrack's* behaviour :

- Start/stop Tracking
- Center Freetrack
- Change Smoothing mode
- Enable/disable given axis
- Change output mode

The sound option allows to hear a sound confirmation on given actions.





The **Global** tab is used to adjust sensitivity, invert and smoothing of each axis, as done in **Profile** tab.

Here you adjust your settings in a global manner. These settings are active whatever profile is selected so it is advised not to modify global adjustments for game customizing, but rather modify profile adjustments.

The interpolation settings are very important :

These parameters have to be adjusted according to the actual webcam framerate, as noted in **Cam** tab :

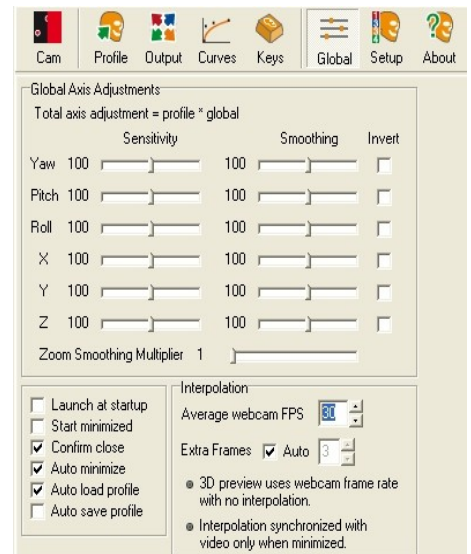
FPS 030 Jitter 00

FPS => Is the number of frames really captured per second by your webcam (green means they're enough frames for a proper FT process).

Jitter => Is the number of unsynchronized frames per second (green means ok, red means bad – too much jitter).

These 2 parameters depend on your Stream parameters and your Interpolation parameters.

Your Average Webcam FPS in the **Global** tab should always be equal to real capture FPS, as shown in **Cam** tab.



The **About** tab provides information on *FreeTrack* Version.



FreeTrack minimizes in systray.  
 The systray FreeTrack icon indicates tracking status.



Capture device not actived or not working.



Working capture device, no markers detected.



Working capture device, markers detected.



**Warning :**

The skull head indicating movements in the FreeTrack window may disappear when a game is run, this last requesting DirectX resources.

The status icon and numerical data provide feedback of the system work.

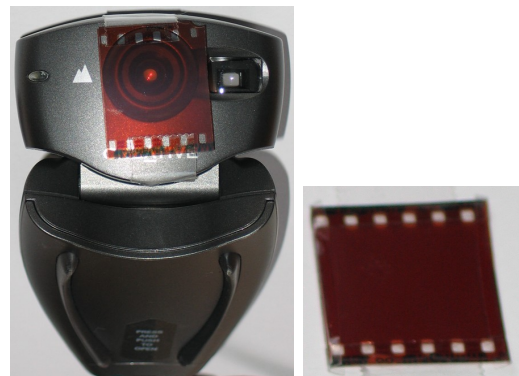
Image Points	Rotation	Translation
0: (-128, -119)	Yaw: 152,3	X: -279,6
1: (-139, -91)	Pitch: 118,1	Y: 253,4
2: (-135, -89)	Roll: -6,5	Z: 633,1
3: (-107, -101)		
	Zoom Deadzone Multiplier:	1,0

## Tips and Tricks

It is highly recommended to minimize *FreeTrack* before running a game to reduce CPU load.

To get help and details on some *FreeTrack* functions, use the balloon help (stay still a few seconds on the function to get. Balloon help is only implemented on major functions, and is not available at this time to minor functions.)

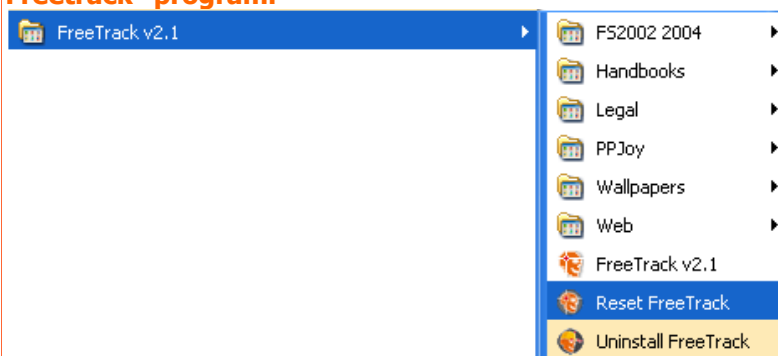
To reduce parasitic lights detected by the webcam, you can put a piece of negative photograph in front of the lens.



### **Warning :**

Take care to close all applications known to use your webcam (Ie : Microsoft MSN Messenger or Microsoft Live Messenger !). Letting them run would drastically drop your Freetrack FPS (see Debug tab) and would therefore reduce your movement precision ingame.

In case of problems with `freetrack.ini` file, or if this file is damaged, just delete it and restart *Freetrack*. A fresh `freetrack.ini` with default values will be created. You can also use the "Reset Freetrack" program.



## Output Modes

FreeTrack provides several output modes :

- FreeTrack native (Trackir compatible).
- Mouse emulation
- Joystick emulation
- Keyboard emulation
- FSX
- FS2002/2004

### Mouse emulation

You can use mouse emulation for games incompatible with *FreeTrack* native mode.

Click on **Profile** tab.

Choose your profile

Check mouse icon.

Choose the axis you want to emulate

Run your game.

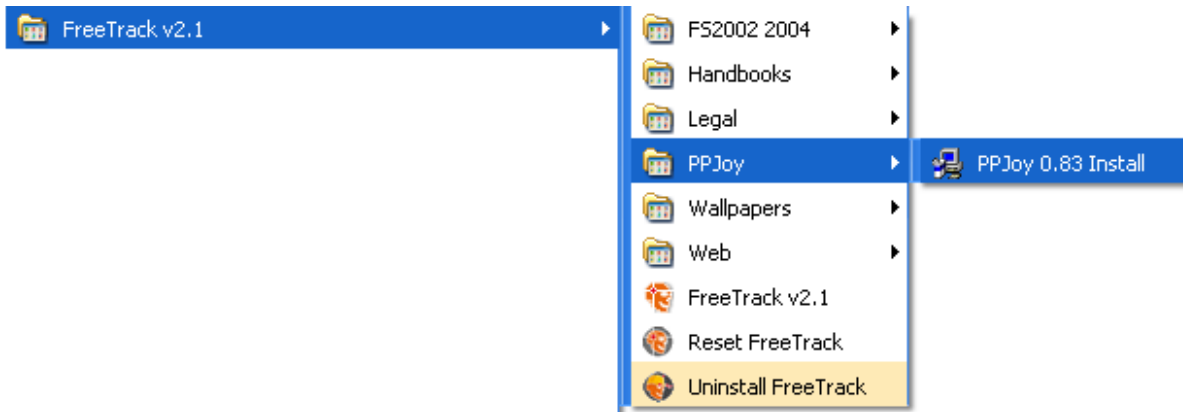


### **Warning :**

**This system only works with games with mouselook feature.**

## Joystick emulation

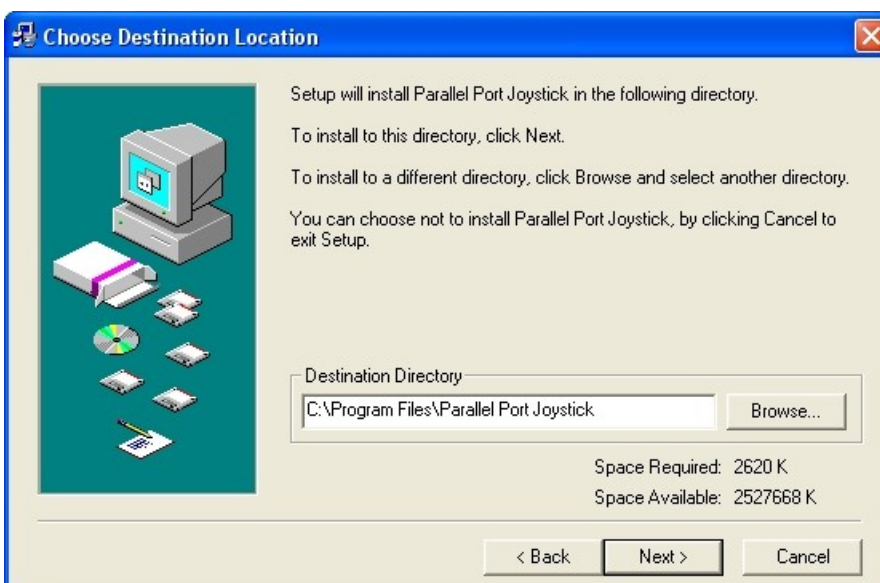
You can use mouse emulation for games incompatible with *FreeTrack* native mode. You'll need the **PPJoy** tool, located here :



Install procedure starts (One time procedure).

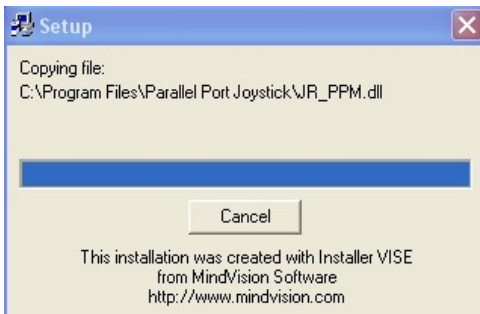


Click **OK**

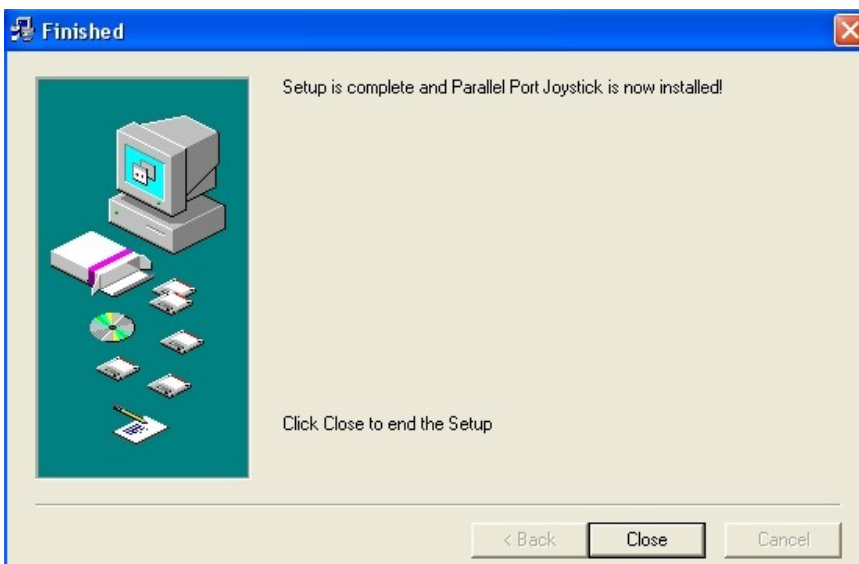


Choose install directory (recommanded : keep default directory) then click **Next**.

File installation starts, as described below.

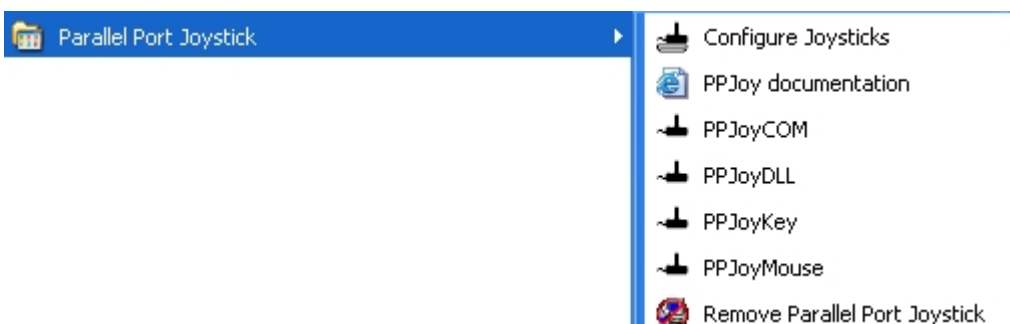


This window is displayed at end of install :



Click on **Close**.

Go in Windows start menu :

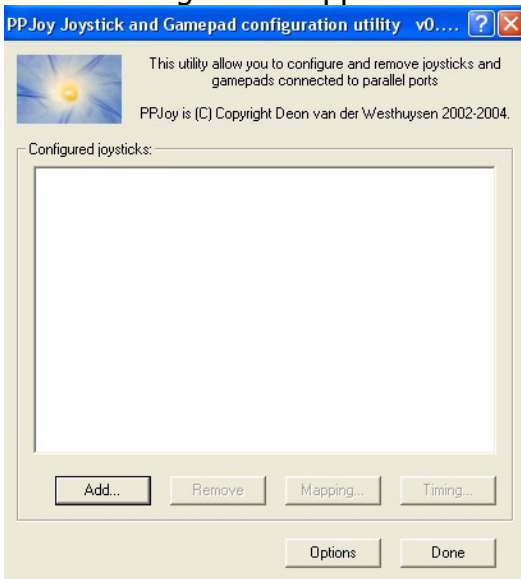


Choose **Configure Joysticks**.

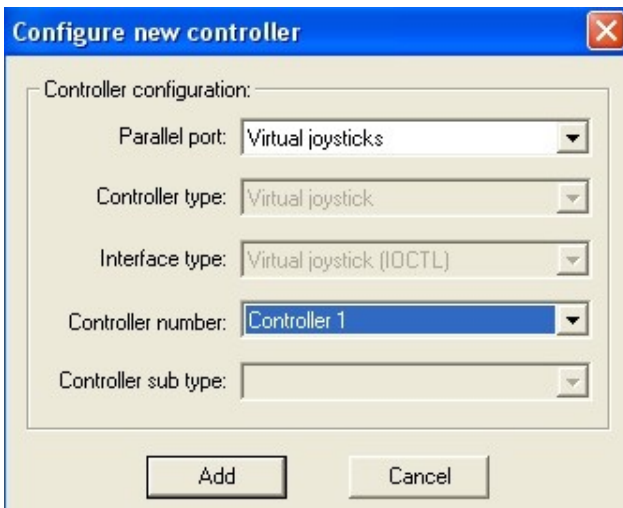
This program will create a virtual joystick, used by *FreeTrack*, pour translate head movements to joystick movements ingame.



The following screen appears.



Click **Add...** and select options as indicated below :



If you already have several game controllers, **Controller 1** may already exist. In this case, choose **Controller number** accordingly. Click on **Add** to confirm. Driver install starts then :

Assistant Matériel détecté

## Assistant Ajout de nouveau matériel détecté

Windows recherche les logiciels en cours et mis à jour sur votre ordinateur, sur le CD d'installation du matériel ou sur le site Windows Update (avec votre permission).  
[Lisez notre Déclaration de confidentialité](#)

Autorisez-vous Windows à se connecter à Windows Update pour rechercher des mises à jour ?

Oui, cette fois seulement  
 Oui, maintenant et chaque fois que je connecte un périphérique  
 Non, pas pour cette fois

Cliquez sur Suivant pour continuer.

< Précédent   Suivant >   Annuler

Assistant Matériel détecté

Cet Assistant vous aide à installer le logiciel pour :

Parallel Port Joystick 1

**Si un CD d'installation ou une disquette a été fourni avec votre périphérique, insérez-le maintenant.**

Quelle tâche voulez-vous que l'Assistant exécute ?

Installer le logiciel automatiquement (recommandé)  
 Installer à partir d'une liste ou d'un emplacement spécifié (utilisateurs expérimentés)

Cliquez sur Suivant pour continuer.

< Précédent   Suivant >   Annuler

Assistant Matériel détecté

## Fin de l'Assistant Ajout de nouveau matériel détecté

Cet Assistant a fini d'installer le logiciel pour :

Parallel Port Joystick 1

Cliquez sur Terminer pour fermer l'Assistant.

< Précédent   Terminer   Annuler

Assistant Matériel détecté

## Assistant Ajout de nouveau matériel détecté

Windows recherche les logiciels en cours et mis à jour sur votre ordinateur, sur le CD d'installation du matériel ou sur le site Windows Update (avec votre permission).  
[Lisez notre Déclaration de confidentialité](#)

Autorisez-vous Windows à se connecter à Windows Update pour rechercher des mises à jour ?

Oui, cette fois seulement  
 Oui, maintenant et chaque fois que je connecte un périphérique  
 Non, pas pour cette fois

Cliquez sur Suivant pour continuer.

< Précédent   Suivant >   Annuler

Assistant Matériel détecté

Cet Assistant vous aide à installer le logiciel pour :

Contrôleur de jeu HID

**Si un CD d'installation ou une disquette a été fourni avec votre périphérique, insérez-le maintenant.**

Quelle tâche voulez-vous que l'Assistant exécute ?

Installer le logiciel automatiquement (recommandé)  
 Installer à partir d'une liste ou d'un emplacement spécifié (utilisateurs expérimentés)

Cliquez sur Suivant pour continuer.

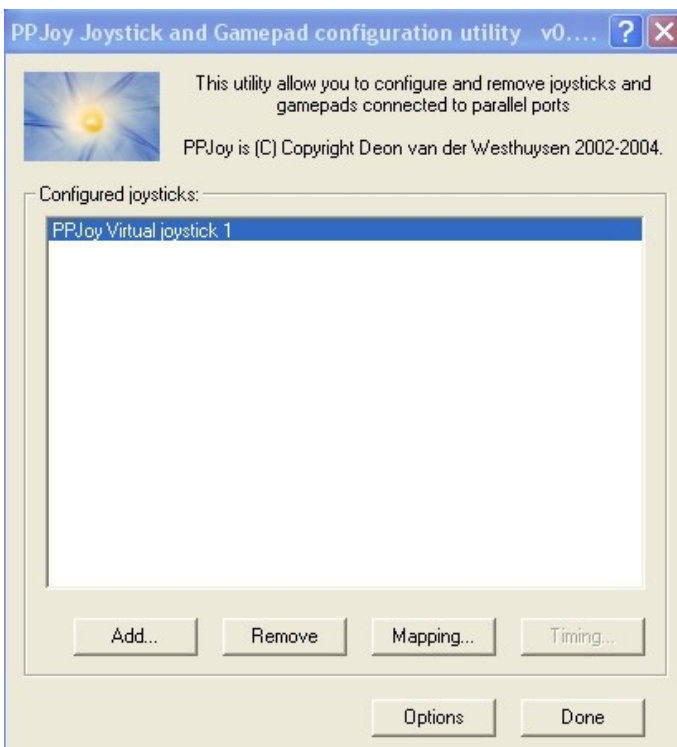
< Précédent   Suivant >   Annuler



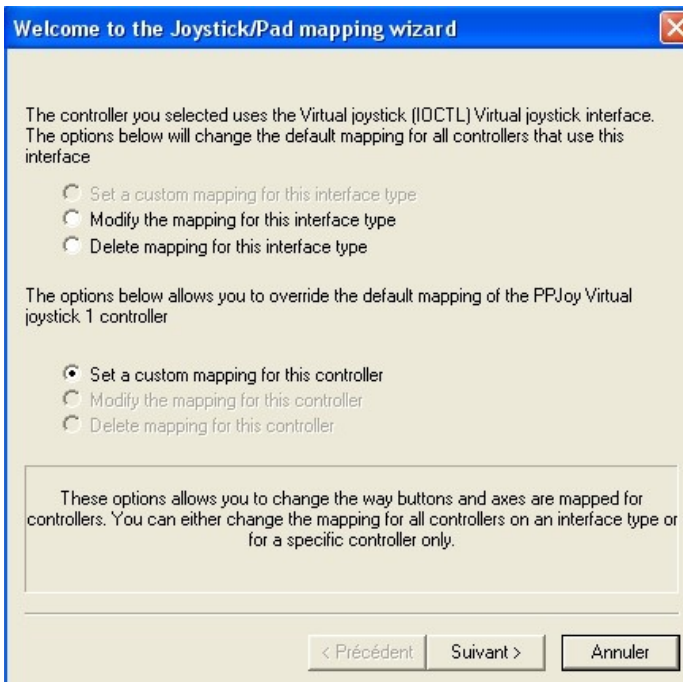
Once finished, the virtual joystick driver is installed and ready to work..

Let's configure it :

Highlight **PPJoy Virtual joystick 1** :



Click on **Mapping...**



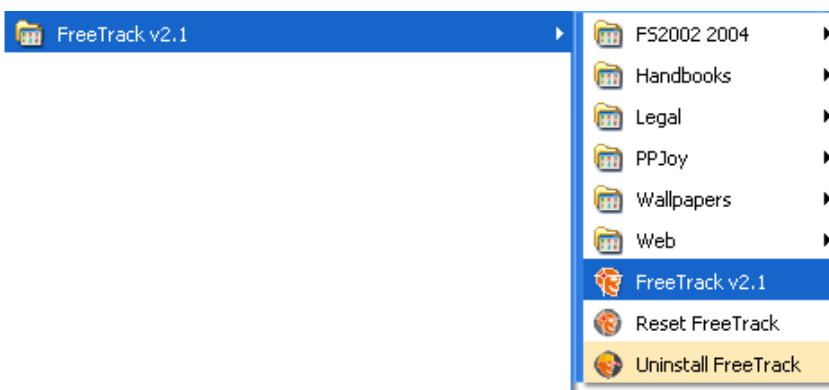
You have to configure 6 axis :

- X rotation -> Yaw
- Y rotation -> Pitch
- Z rotation -> Roll
- X -> translation x left/right
- Y -> translation Y zoom/unzoom
- Z -> translation Z high/low

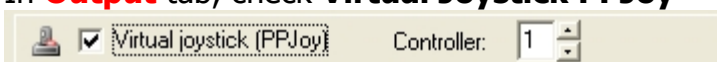
Your virtual joystick doesn't have buttons nor POV.

Click on **Next** to configure your joystick axis :  
6 axis, nothing else !

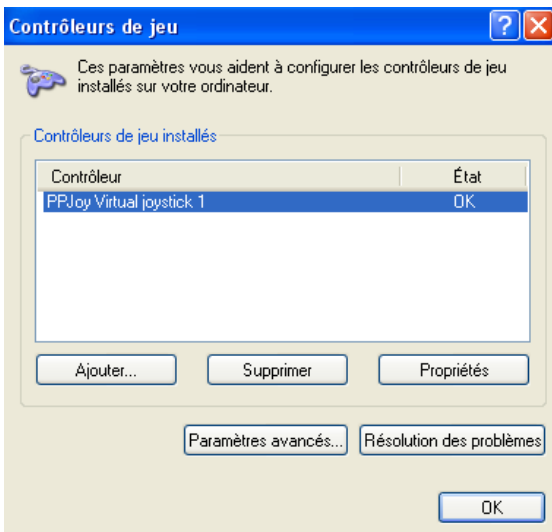
Once your axis are configured, run **FreeTrack v2.1**



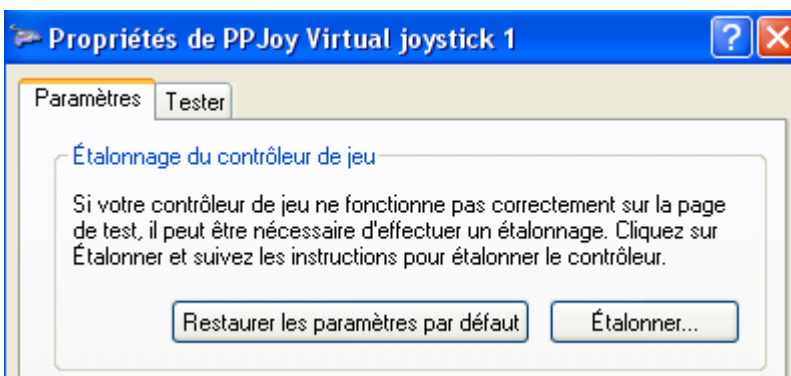
In **Output** tab, check **Virtual Joystick PPJoy**



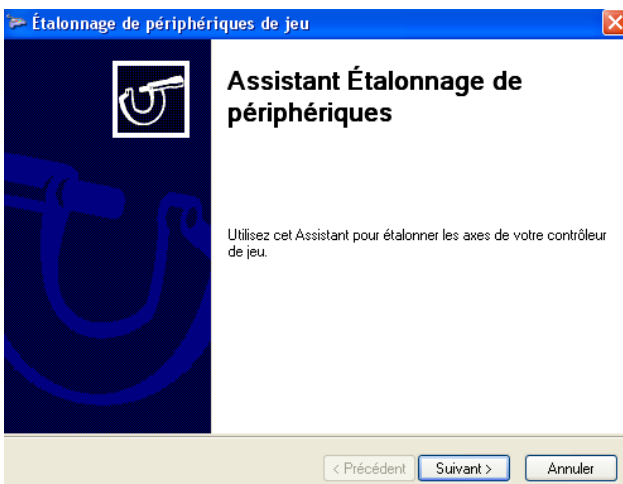
Calibrate your virtual joystick (in control panel -> game controllers -> PPJoy Virtual Joystick 1).



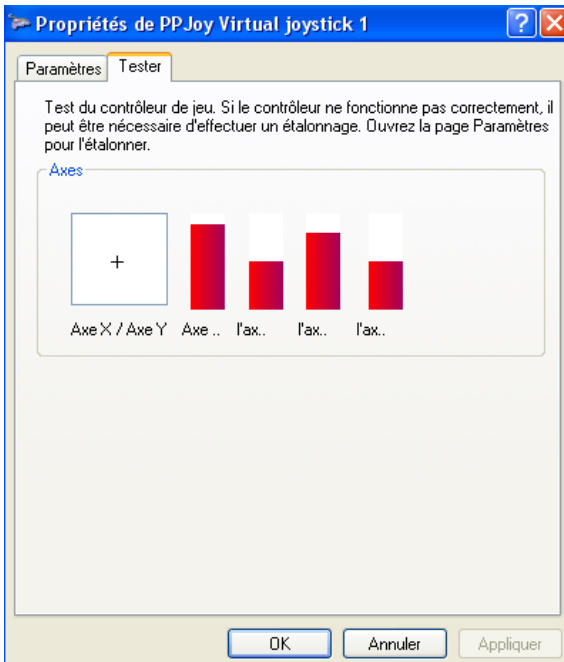
Click on **properties**



**Parameters** tab, click on sur **Calibration...**



Click **Next** and follow instructions to complete calibration.  
Once calibration is complete, go to **Check** tab to verify your setup.



Run your game and setup your views to your new virtual joystick axis.



**Warning :**

**This system doesn't work on all games.**

**Virtual joystick driver has been tested with Windows XP SP2, but is not guaranteed to work with Windows Vista. (Some users have tested it with Windows Vista.)**

**(Successfully used on Nascar Racing 2003)**

**Keyboard emulation**

You can use keyboard emulation for games incompatible with *FreeTrack* native mode.

In **Output** tab, check **Keys** options

Assign keyboard keys to head position zones.

In your games, assign the same keys to the appropriate actions.

You can check the key result of your movements by looking at the status window

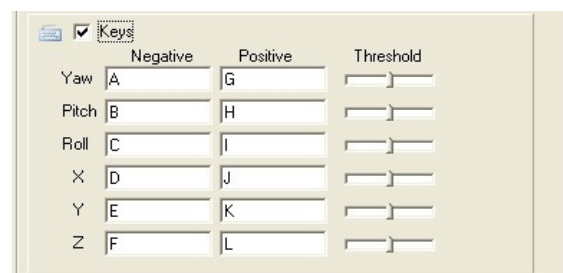


Image Points	Rotation	S	Translation	S
0: ( 11, -37)	Yaw: 157,51	4,9	X: -157,53	39,9
1: ( 15, 0)	Pitch: -67,54	5,0	Y: 0,20	40,0
2: ( 8, 53)	Roll: 157,51	5,0	Z: 157,53	38,5
3: ( 0, 0)				
S Multiplier: 1,0		Stable Raw Center		Key: GIDL



**Warning :**

**This system doesn't work with all games.**



Profile creation :

Since FreeTrack doesn't work the same manner in all games, you'll have to create or download different profiles to get the best of each game.

**Warning :**  
**Be sure to download FreeTrack V2.1 compatible profiles !!!**

You can find ready to work profiles here :  
<http://www.free-track.org/multimedia/profils.php>

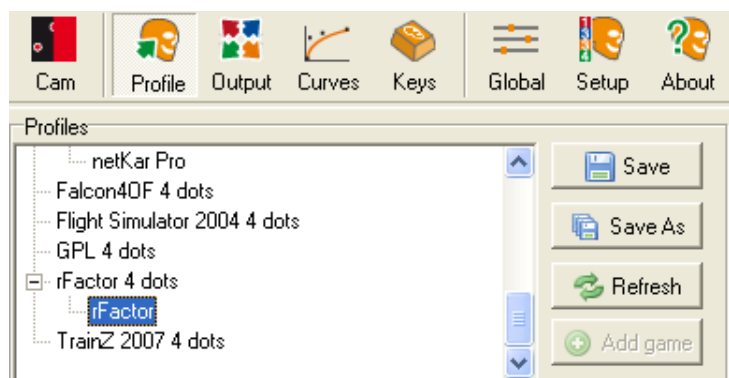


Once profiles have been downloaded unpack them in `Freetrack\profiles` directory. Your new profiles should then appear in your profile list in **Profile** tab.

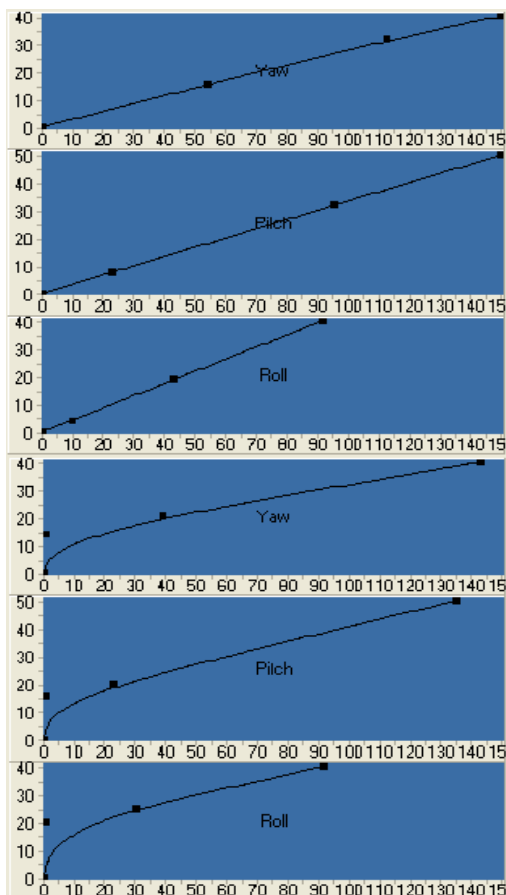
One of the 2.1 new tool is the ability to directly link the profile to the game.

When you run an unknow game, and FT is in native mode, the **add game** button becomes available and allows to create a link between the game id and the current profile.

You can also drag-n-drop the game id to the desired profile (IE here : rfactor).



To have progressive movements, try to keep **Yaw**, **Pitch** and **Roll** graphs as straight as possible, starting at 0. (the more they go to the right side, the mode your head movements are amplified).



You'll notice your movements are reproduced very quickly and in a constant manner, relative to your head movements.

This is the theoretical perfect curve. The problem with such a curve is, when your head is still, the view in *Freetrack* shakes a lot.

There are several ways to solve this problem :

- 1) you can increase the **Average** value, but this inserts a delay in movement processing.
- 2) (more interesting solution, IMO) you can smoothen the curves near 0 degrees to reduce shaking. You can notice how shaking is reduced when you stay still.
- 3) You can alter deadzones for each axis

Once you have a satisfying result, check the numerical values to tweak the settings, to reduce shaking even more.

(but remember : perfection doesn't exist)

The **Profile** tab is used to create custom game profiles, and invert selected axis. If you notice an inverted axis within a game, you can revert it back by checking the appropriate checkbox. You can also alter movement sensitivity and add a deadzone, per axis.

You can add, rename and delete profiles by right-clicking in the profiles list.

- If **Average** option is low, your movements will be very reactive, but difficult to handle. The more this option is increased, the smoother the movements will be, but also the more you'll notice a reaction delay.



### **Warning :**

**You have to find a compromise in setting all these parameters, which you are comfy with.**

## Custom setup games

Here you'll find a small list of games successfully tested with *FreeTrack*, with some tips below.

### Game

### DOF

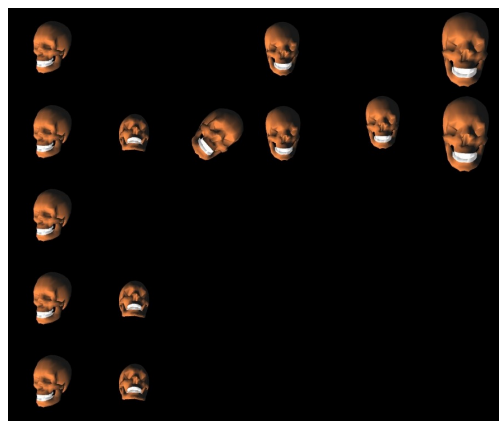
**Grand Prix Legends (GPLShift 7.3.2)\***

**Live for Speed S2 (W47 ou supérieur)\*\***

**Nascar Racing 2003\*\*\***

**F1 Challenge 99-02\*\*\*\***

**Combat Flight Simulator 3\*\*\*\*\***



\* For Grand Prix Legends, You'll need to use patch GPLShift version 7.3.2 and rename freetrack.exe to TrackIR.exe

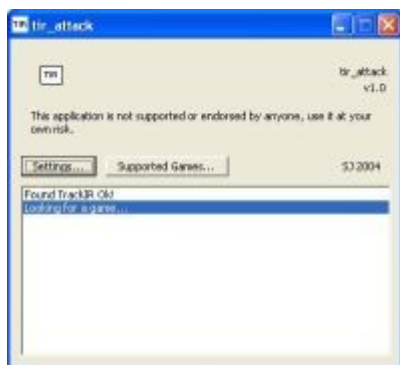
\*\* Roll axis is inverted

\*\*\* With use of PPJoy Emulation.

\*\*\*\* With use of TIR\_Attack 1.6.

[http://www.geocities.com/tir\\_temp/](http://www.geocities.com/tir_temp/)

[http://www.geocities.com/tir\\_temp/tir\\_attack\\_1\\_6.zip](http://www.geocities.com/tir_temp/tir_attack_1_6.zip)



For an up-to-date list of supported games, please consult [Didja's](#) web site:

<http://www.free-track.org/freetrack/liste-titres-compatibles.php>

## Credits

Thanks to :

### **The Freetrack V2.1 Team**

<b>The target</b>	Creator, Freetrack programmer, Forum Moderator
<b>Kestrel7e7</b>	Freetrack programmer, Forum Moderator
<b>Poncho</b>	Graphic designer
<b>Didja</b>	Webmaster, Forum Administrator
<b>Tristan68</b>	Betatester, Translator, Led handbook, Forum Moderator
<b>Babasiior</b>	Betatester, Freetrack Handbook, Installer, Forum Moderator

### **Bundled software**

<b>Deon van der Westhuysen</b>	Creator of <b>PPJoy</b>
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And to all Freetrack Supporters

#### **Disclaimer**

*Babasiior, The\_target, Krestel, Didja, Poncho, Tristan68, cannot be held responsible for any damage caused by the use of the FreeTrack v2.1 software and this handbook.*

Use this software and handbook at your own risks !!

Thank you to have taken the time to read this handbook, which, I hope , answers most of your questions.

Successive versions of this handbook take account of your remarks and thoughts.

*Come join us on the Freetrack Forum and tell us your remarks and thoughts about this software and handbook : <http://www.free-track.org/forum>*