



before you can use centertracker you will *possibly* need to install the **Microsoft Visual C++ 2008 SP1 Redistributable Package** (just a few MB):

<http://www.microsoft.com/downloads/en/details.aspx?familyid=A5C84275-3B97-4AB7-A40D-3802B2AF5FC2&displaylang=en#Overview>

(please use the version that applies to your OS, i.e. 32bit/64 bit, Vista, Win7 etc)

to make use of the AVS file created by centertracker you'll need of course:

AviSynth, VirtualDub

+ possibly for audio the AC3 codec (please refer to the readme file for installation):

<http://fcchandler.home.comcast.net/~fcchandler/AC3ACM/>

further installations are recommended for (de)compressing your videos: Xvid (min.(!) version 1.3.2) or other Video Codec (packs)

hint: in order for Centertracker to be able to start the created AVS files automatically you have to link the file type AVS to VirtualDub (-> open with -> choose default program... -> VirtualDub)

hint2: there are two program versions of Centertracker which you can execute depending on your needs:

cte_am.exe

cte_a.exe

with the 'am' version you can (possibly) also load other video formats than AVI. If you use AVI files you should use the 'a' version. Please note that the frame-number may be displayed incorrectly with some video formats (such as WMV for example).



Centertracker deluxe offers the following advantages compared to the freeware version Centertracker 2.1.x:

- **increased processing speed** * (especially pleasant for template mode 2 when detecting object rotation that had been very slow so far); (* except for template mode 1 (deprecated) which is only a little bit faster)
- adaptive detection (speeds up object size detection in template mode 2)
- simple data transfer of the color values in overlay mode
- overlay option for all four tracking modes (instead of only one for template mode)
- a separate directory (overlay images) with **overlay image examples**
- **mosaic effect/ concealment** and **object magnification** for template mode
- tracking with **invariable template**: avoids an irreversible deviance of the template from the original object (this is especially useful for the mosaic and magnification option)
- set max. and min. size for template (useful for object size detection)
- two instead of one methods for saving AVI videos
- **no clipping** option, i.e. the whole video frame stays visible, borders are *not* clipped

- **video stabilisation** for shaky videos: with optional zoom and rotation detection: the frames are corrected by their angle, i.e. angle stabilisation takes place. Please note that a precise correction is not possible in all cases (e.g. if movements in the foreground and the background deviate too much from each other or if the number of reference points is too small (monotone background)). If the result is not satisfactory set max. zoom and max. angle to zero. The video stabilizer can also be run in **Centertracker mode (CT)**, i.e. the stabilising method is applied to a chosen template which is then centered
- updates (the programmer of Centertracker is not obliged to create updates though) which are free for one year (as of date of purchase) for the customer (under the conditions of the end user license agreement (EULA)).
- **optional audio saving** for the stabilizer and for 'mosaic overlay', 'magnify object', 'emphasize', 'colorize', 'binoculars'
- and further (see PDF info files)

Overview of how Centertracker works:

The application has been designed in a way to be *almost* self-explanatory. So you may just jump off into it and start centertracking. However you may need to refer to the "how to's". So here's a bit more details that will help you to use Centertracker.

For the Stabilize option please refer to the file rot_guide.pdf (also reachable via the first icon in the starting screen).

Centertracker tracks a selected object in a video and centers it in the middle of the screen along the whole video. You have four modes you can choose from: color tracking, contour tracking, template tracking and brightness tracking. Here's what you have to do for each mode:

a) color tracking

First you have to choose a reference image to determine the color thresholds for your object. For this purpose you have to choose a video file when asked to. Wait a few seconds until the computer has created images to choose from (skip by pressing a key; you do not need to wait until the end of the video is reached).

If you have ticked **wing beat compensation** please refer to d) brightness mode. You cannot tick **limit detection area** in color mode but you can still choose a rectangular area for this purpose in the frame window (the search area will either be static or adaptive to the object depending on whether or not you tick **follow mode**).

----- additional mouse click options -----

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- left click: choose an area (via 2 left clicks: upper left and lower right corner) so that you can minimize artefacts or background noise. The object should remain in that area during the whole video/ scene unless you tick **follow mode** in the starting window (where you choose the tracking mode)
- right click: choose another centering position than the middle of the screen. This can be useful if

you want to track an object which is not supposed to be in the center

Now choose the color thresholds. Draw the sliders in a way that the object will appear as much filled with white as possible while every other object or structure in the picture should stay dark.

When done press a key. The program creates a path that shows the tracking of your object. Finally it creates an AVS file which you have to run with VirtualDub (this can take place automatically if you have linked the file type AVS to VirtualDub). In VirtualDub you can save your new avi and apply additional filters.

b) contour tracking

similar procedure as in mode a) except that you only need to adjust two instead of six sliders. Doing so sets a lower and an upper threshold for the contours of the object. The computer will create a path for those contours according to your settings. This mode is suitable for a single distinctive object that moves across a more or less monotone background, e.g. a plane that moves in front of the blue sky.

c) template tracking

This tracking mode is very useful in cases where there's a lot of background "noise", i.e. for non-monotone backgrounds. If you tick **follow mode** in the starting window you can limit the detection area around the template picture (which you choose via 2 left clicks) to make processing faster. Especially in cases in which neither of the other tracking modes delivers good results the template mode should be applied. After the program has created some sample frames (skip by pressing a key) you choose a sample frame with the slider and then you have to select the area of the object you want to track (the template). You do this via 2 left clicks. In follow mode you also need to define with the sliders a **search area** around the template. You position the search area via **position x** and **position y**, its size is adjusted with **area limit x** and **area limit y**. The template should sit in the center of the search area unless you have adjusted the similarity parameter. **Similarity** plays a role in cases where the object disappears from the image area and later reappears in it again. As soon as the similarity value is underrun (i.e. the object disappears or becomes too indistinct) the whole frame is scanned instead of just the search area. If similarity is set to zero and the object disappears the program simply chooses the most similar area and thereby this new area replaces the template. To avoid that you should adjust the similarity parameter thoroughly. Its value usually lays somewhere between 900 and 1000 (1000 means that the object practically must not change at all to stay detectable, i.e. neither change in color nor by its contours; zero means that it may change arbitrarily).

For information about template mode 2 please refer to file 'tmg_guide.pdf' (template mode guide) which you can also reach by clicking the fourth button from left (to the left of the Centertracker lettering) in the starting screen.

Via the option **detect object size** you instruct the program to scan for the size of the object. In mode 1, with **zoom speed** you can adapt more accurately to the zoom speed of your camcorder/video or rather to the size change of your template. If zoom is slow you should choose a low setting while in the other case a higher one. To find out which setting fits best you have to go through the different settings and experiment.

In mode 2 the zoom speed option is a zoom *sensitivity* option, i.e. you have automatic zoom speed

detection and you can specify the response threshold (*responsiveness*) (instead of speed). The further right the box you tick the less sensitive zoom detection occurs. Basically this means that the size *change* from frame to frame has to reach *bigger* values than at a lower setting before the detection responds. Experiment a bit to find out about good settings.

If you tick the option **detect object rotation** Centertracker will try to recognize rotation of the object. For more about this topic refer to the template mode guide.

The option **invariable template** serves to avoid deviances that cause too big changes to the template and thereby prevent the detection of the original object. It makes sure that always the most similar area to the object in the frame resp. the search area is detected. If there is a strong deviance though (e.g. panning of the head/ deformation of the object contours) a (temporary) deviance may occur, too. This option is especially useful for mosaic concealment (e.g. garbling people's faces) and object magnification.

To be precise, invariable means *more or less* invariable, i.e. according to your settings. The default setting for **refresh** (in the settings window) is 5. This means that the template is refreshed every 5 frames. Thus, if you set the parameter to zero the template will never change, i.e. become *invariable*. If you set it to 1 the template will change every frame like it is the case if you do not enable the option **invariable template**. The setting also affects detection of object zoom and rotation as both only will be adapted while refreshing.

To prevent the template of becoming too big or small you can vary the parameters **max. width** and **min. width** which define the maximum and minimum sizes the template may have.

d) brightness tracking

In this mode you choose the brightness of your object in order to track it. By ticking the **wing beat compensation** option (if your object is a bird) a different method (method 2) for centering is applied which will attempt to minimize the jiggling caused by the wing beat of the bird. With both methods you can choose a search area (either a static one or one that follows the object (follow mode)). Limiting the search area will make processing faster and reduce the influence of noise. A static search area will take care of an effect that is caused by the lense of your camera: towards the borders of the screen brightness decreases a bit which may cause noise. This noise will be excluded then. The search area can be circular or rectangular. For the former you have to tick the option **limit search area**, for the latter you need to mark a rectangle in the window where you choose a frame. If you want to let the search area follow your object activate **follow mode**.

Two options are available for brightness tracking: **relative** and **absolute** brightness. Relative means that the brightness is chosen relative to the darkest (resp. brightest) pixel in the frame so that values in the selected *range* above (below) that pixel are shown in white. Absolute is trivial: values below (above) the selected *value* are shown in white. If your object is bright tick **bright object** in the starting screen.

'Absolute' is usually faster than 'relative' except for blank frames, so you can speed up processing a bit by choosing absolute (default). Variations in total brightness during the video are not considered though. If you want to include them you have to select 'relative'.

Overlay- option (all tracking modes):

If you click this option for any of the tracking modes (the frame around the word overlay appears yellow then) you can choose an overlay image which will be overlayed on the the selected object or on another area of the frame. In order to exclude a certain range of colors in the overlay image navigate the mouse pointer above the desired location (pixel)/ color and transfer the respective RGB values to the overlay settings window via the combination **STRG + right click**. After that you adjust the **range** to exclude lower and higher tones of that color. In addition you can adjust the **opacity** of the overlay image. Experiment a bit with the sliders to check how adjusting the parameters alters the appearance of the overlay. Position the overlay via **right click**. If you use the overlay option with a tracking mode different from the template mode it can be useful to tick **constant overlay image size** in the starting window. Thereby you avoid a possible incorrect size adjustment of the overlay. Of course you can also activate that in template mode. You can find more on the overlay option in the image overlay guide (2nd symbol from left, to the left of the lettering 'Centertracker').

border filling:

Four modes are available to fill the borders which result from panning and rotation of the frame. Those modes are self-explanatory: **black, white, original, mirrored**. *Instead of* mirroring the **last frames** are used in stabilisation mode. If the object is located rather in the middle of the screen and the background is monotone the option original can be useful.

If the overlay option is ticked border filling is or course not applied as there will be no borders to fill.

no clipping:

Tick the respective box (either the one for the tracking modes or the one for stabilisation) to always make the whole frame visible. By this the dimensions of the video will be increased but no image data of the borders is 'lost'. *Warning:* the dimensions may exceed the max. resolution of your display.

Saving AVIs:

You can produce a video both of the processed frames for the tracking modes color, contours, brightness and of the stabilizing. The video can also be played in other video players besides VirtualDub. Audio is optional (speaker symbol). If you have ticked '**detect zoom & rotation**' for stabilisation saving the AVI is obligatory. For saving there are two methods available. The first (default) method uses OpenCV, the second one '**use method 2 to save avi**' should be used if the first one does not work. Which method is the right one depends on the video codecs which are installed on your computer. For example for Xvid the default method should be used.

additional options:

- deinterlace
- emphasize*
- colorize*
- binoculars*

* please refer to manual "spect.pdf" (or click on symbol 'special effects')

trouble-shooting (before you call the doctor):

sometimes the program may behave unexpectedly. Here's a list of problems that may occur and their solution:

- no result video is saved: please check the folder of your video for a file called 'result_ct.avi'. If it exists but is empty or corrupt delete it. Now it should be possible to save the result video. However, usually that cannot happen as Centertracker deletes the file at start. It's more likely you have the file still open in another application (VirtualDub?). If so, close that app. There are available two saving methods, please keep in mind that not all available compression options shown in the list will work, you have to use those that actually do work (saving method 2 is useful for uncompressed videos while saving mode 1 can be used with Xvid)
- there appear messages in the black window: you can usually ignore them except in the rare case of a program crash. If latter happens (and you find no reasonable explanation for it) you can contact me reporting the displayed message.
- processing speed is very slow: please choose reasonable values for the different parameters. Some settings will lead to a huge amount of data and therefore processing becomes slow. Please refer to the manuals for adjusting settings
- video format is not supported: this mainly depends on the codecs you have installed on your computer. Centertracker can only read the different video formats if the respective codecs are available
- Centertracker crashes when I press a key in the settings window: numerous combinations of settings are possible but not all will make sense. Please adjust the parameters in a way that makes logically sense. Also be sure to choose a reference area/ template when needed
- when you start the AVS file you get an error message:

'AviSynth Open failure

Audiodub: need an audio and a video track'

your source video has no audio. Open the AVS file manually with Notepad and replace the last two lines:

```
c=directshowsource("E:\I\...avi")
```

```
AudioDub(b,c)
```

with:

```
return b
```

save the file and open it.

a similar situation may occur with Template-Tracking. If you had checked "no clipping" and the original video is without audio delete the following line:

bla3=audiodub(bla2,clip)

and replace *bla3* by *bla2* in the next line.

- the program does not work at all: you may be running the software with an 'old' or non-SSE2 supporting CPU. Please check if that is the case, you can get a hint here:

<http://en.wikipedia.org/wiki/SSE2>

if you find this to be the case please contact me. If your CPU supports SSE2 please check if you have followed the intro notes of this document.