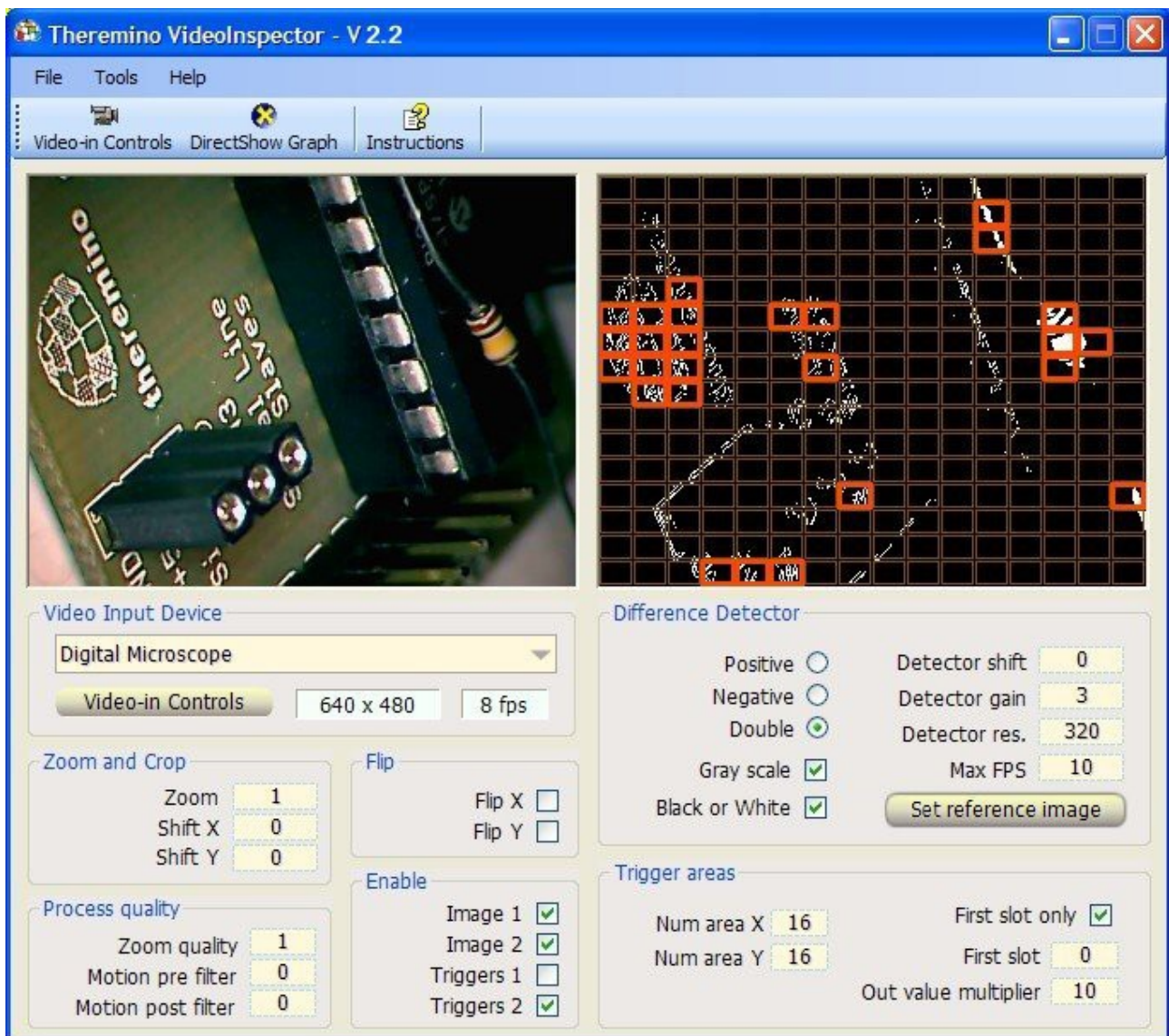


theremino
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System Theremino

Theremino Video Inspector Instructions

Theremino Video Inspector



The Video Inspector was initially designed to identify missing components on printed circuit boards during the testing of the system modules Theremino.

The functional test does not show some errors, such as the lack of protection diode on the power supply, so a visual inspection is always required. Unfortunately, the human operators after a few hundred modules begin to no longer work well and tend to "complain". This program does not replace the operator but supplies an alarm indication, and allows you to work much faster, without getting tired.

The functions of this program are:

- ◆ Reading of the video signal
- ◆ Signal Conditioning
- ◆ Extraction of the differences from a comparison picture
- ◆ Writing the difference values in the Theremino System "Slots"

Interaction with the Theremino System

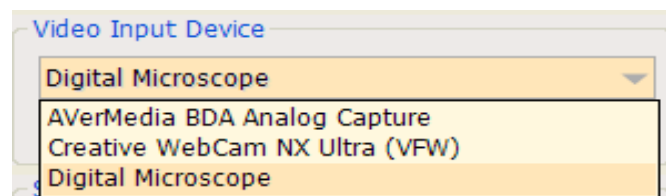
The Video Input is a Theremino modular component (1) and interacts with the other components of the system through the Slots (2)

(1) Theremino is a modular system consisting of software and hardware components connected via USB.

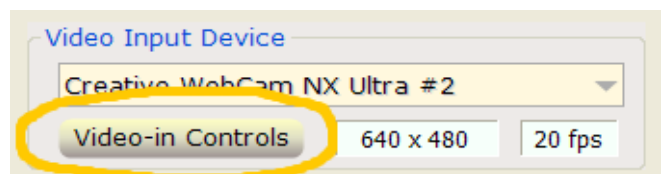
(2) The slot cells are in the "Memory Mapped File" named "Theremino1" named with a number from 0 to 999. Each "slot" contains a "Float" number (4 bytes) and can be written or read by every program on the system, in a very short time (a few microseconds). With slots you can keep a fast communication of data and information between different service processes, making possible the true hardware and software modularity.

Selecting the video input device

Clicking on the name you choose the input device.



The "Video controls" button opens the panel of the video input parameters (See next page)



When you buy a device, make sure it is at least 720p HD (1280 x 720) or better yet, Full-HD 1080p (1920 x 1080) And be careful not to be fooled by the many mega-pixels that are often declared.

The mega pixels interpolated by the software are always much higher resolution of the real hardware but you have to identify the true resolution, which unfortunately is often the usual 640 x 480.

Tips for PCB testing

Use a good camera with the highest possible resolution.

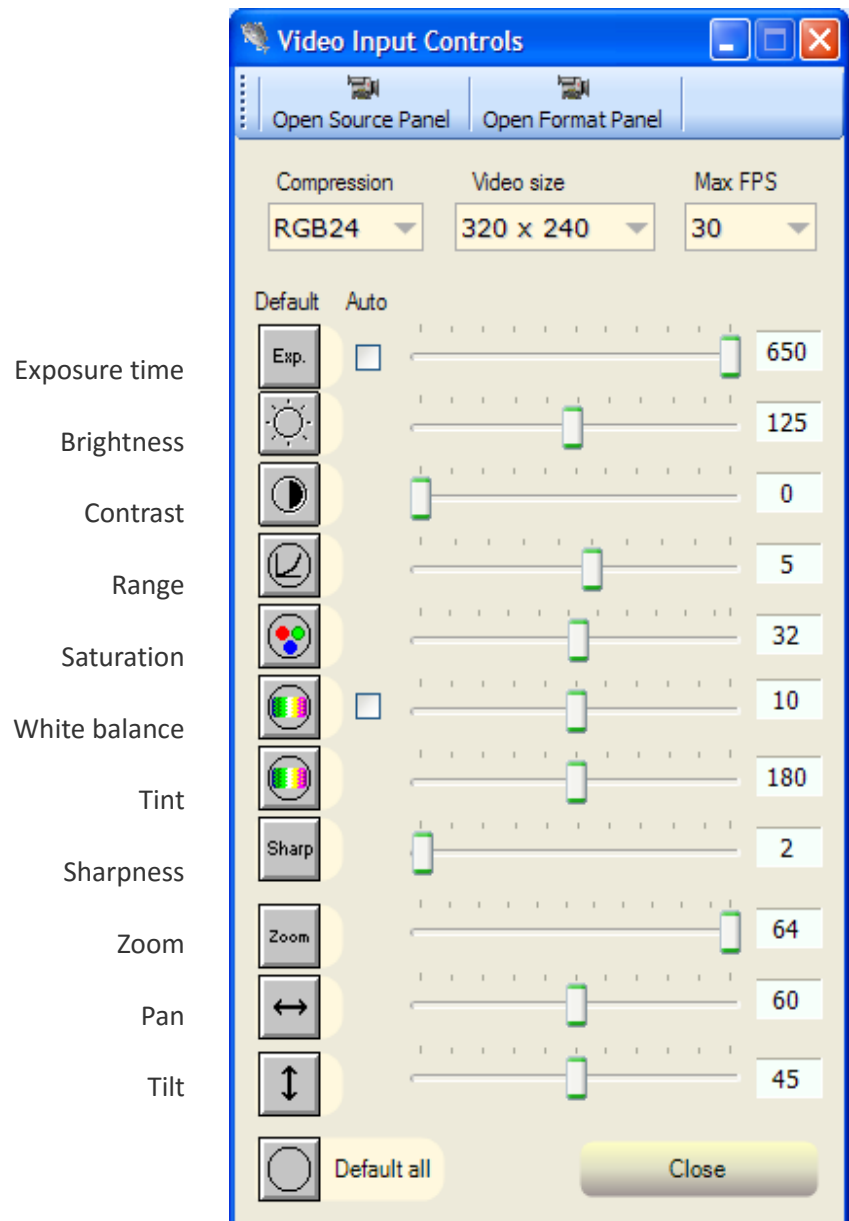
Illuminate from all directions, with perfectly diffused light, otherwise the reflections on the pond welding, which vary from one PCB to another, would cause continual alarms.

If the PCB is great you can not inspect everything in one image and you will have to use alternative solutions with multiple cameras or by moving the PCB several times.

Adjusting the video input parameters

Depending on the device selected video some of these properties can be disabled. For example, if you use the 'OVT Scanner Settings "Zoom", "Pan" and "Tilt" are not enabled.

It can easily happen to accidentally leave active the box "Auto", so the box "Auto" is always disabled at the start of the program even if they were active in the previous session.



These properties are only accessible if you use video devices with drivers such as "WMV". If you only have drivers "VFW" it will be necessary to use "Open source panel" and "Open format panel" as shown on the next page.

Adjusting properties for devices VFW

Some properties of the video devices may be accessible only with "Open source panel" and "Open format panel."

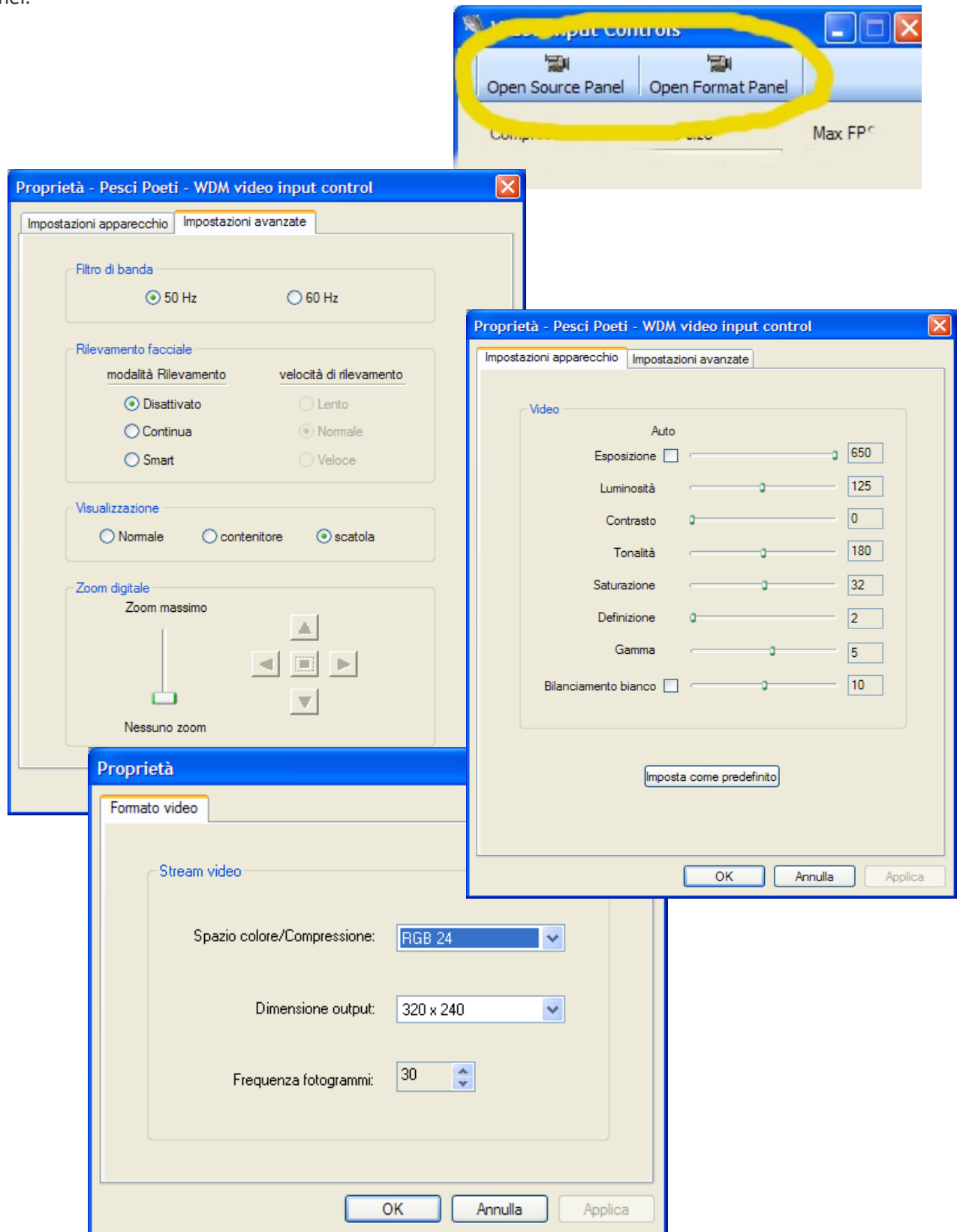


Image adjustments

The image shows two panels from the Theremino VideoInspector software. The top panel, titled 'Zoom and Crop', contains three input fields: 'Zoom' set to 1, 'Shift X' set to 0, and 'Shift Y' set to 0. The bottom panel, titled 'Process quality', contains three input fields: 'Zoom quality' set to 1, 'Motion pre filter' set to 0, and 'Motion post filter' set to 0. All input fields are yellow with black text and numbers.

Zoom

Digital magnification of the image. You can also magnify with the mouse wheel.

ShiftX / Shifty

You can make the image move with these boxes or by pressing the left mouse button on the image and dragging it. Shifting is only valid if the image is enlarged.

Zoom quality

Adjust quality for the digital on-screen magnification.

Motion pre filter first acts of the algorithm for the detection of differences, if you set it to zero disables and the resolution used for the filter of the differences becomes the same as the original image of the camera. We use "Motion pre filter" and "Detector res." to save computation time or to decrease the resolution of the detector in some cases. Try what conditions provide the best results.

Motion post filter acts on the output of the algorithm of detection of differences, in some cases it can decrease the noise and eliminate tiny dots. Try what conditions provide the best results.

The image shows two panels from the Theremino VideoInspector software. The top panel, titled 'Flip', contains two checkboxes: 'Flip X' and 'Flip Y', both of which are unchecked. The bottom panel, titled 'Enable', contains four checkboxes: 'Image 1' (checked), 'Image 2' (checked), 'Triggers 1' (unchecked), and 'Triggers 2' (checked). The checkboxes are blue with white text and symbols.

FlipX / Flipy

Flip Horizontal and vertical image.

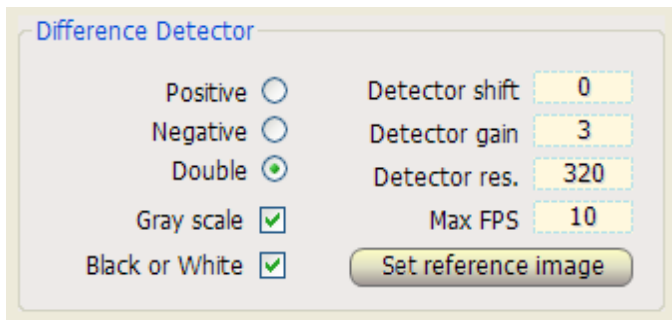
Image1 - Enabling the image on the left.

Image2 - Enabling the image on the left.

Triggers1 - Enabling the areas of the trigger in the first image.

Triggers2 - Enabling trigger areas in the second image.

Extraction of the differences



Positive - Is used to isolate the differences from dark to lighter.

Negative - Is used to isolate the differences from lighter to darker.

Double - Used to identify all the variations.

Gray scales - Mix all the colors in a gray scale.

Black or White - Make a threshold function and turns to black or white.

Detector shift - Adjusts the difference detector zero level (brightness)

Detector gain - Adjusts the difference detector gain (contrast)

Detector res. - Adjusts the difference detector horizontal resolution **(1)**

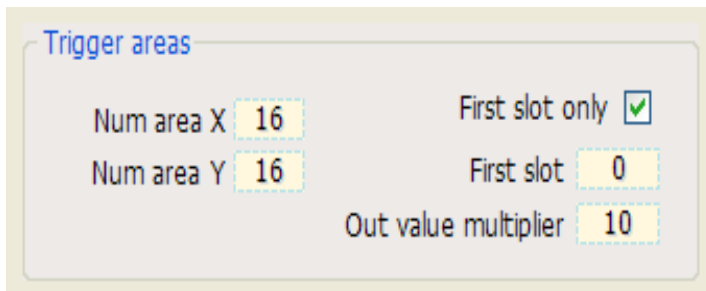
Max FPS - Reduction of the working frequency of the detector (to save CPU time)

Set reference image - Initializes the reference image **(2)**

(1) "Detector res." Acts only if "Motion pre filter" is non-zero, otherwise the resolution is always that of the original image in the camera's arrival. Using "Detector res." to save computation time or to decrease the resolution of the detector in some cases. Try as a condition provides the best results.

(2) "Set reference image" After initializing the reference image, also save it to the file "ReferenceImage.png", in the application EXE folder. This image will be reloaded each new start of the application.

Trigger areas



Trigger areas

| | | | |
|----------------------|----|-----------------|-------------------------------------|
| Num area X | 16 | First slot only | <input checked="" type="checkbox"/> |
| Num area Y | 16 | First slot | 0 |
| Out value multiplier | | 10 | |

The total number of areas is given by "Num area X" multiplied by "Num area Y".

- ◆ **Num area X** sets the number of columns from 1 to 16
- ◆ **Num area Y** sets the number of rows from 1 to 16

If **"First slot only" is disabled** each area sends its value to a different slot, are then used a number of slots equal to the number of areas.

If **"First slot only" is enabled** then a single slot is used. The values of all the areas are compared and the greater is sent to the slot number with "First slot".

"Out multiplier value" serves to multiply the output value. This value is changed depending on the lighting conditions and the size of the components to identify, to obtain the output values in a "range" normal. In the system Theremino generally using output values from 0 to 1000.

The output values

Someone may be disappointed by finding that this application, having extracted with great care motion data, do not use them to issue directions or alarm sounds.

It would have been easy to add these features but we preferred to go only up to write data into the slots, to allow maximum flexibility in the use of the same.

The philosophy of the system Theremino provides software modularity, each application must therefore play only part of the job he can do well and leave to other applications tasks of different types. This makes it possible to develop complex systems simply by combining hardware and software modules such as Lego bricks.

The data can then also be used in ways not foreseen at the time of writing of this application.

Alarm functions can be implemented with the Theremino_Script application or other more complex languages such as C + +, CSharp, VBnet, VB6 and Pascal.