

# Suspicious Behavior Detection System

VibraMID

MANUAL

Version VibraMID10

ELSYS Corp.

[WWW.ELSYS.RU](http://WWW.ELSYS.RU)

[WWW.PSYMAKER.COM](http://WWW.PSYMAKER.COM)

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# 1 Introduction

Welcome to the **VibraImage** World! Thank you for your purchase of **VibraMID** system. This Manual is written to help you enjoy **vibraimaging** and open new features in well-known objects!

**VibraImage** technology measures micromovement (micro motion, vibration) of person by standard digital, web or television cameras and image processing. Human head microvibration is linked with the vestibular-emotional reflex (VER) of a person and reflects emotion status and personality traits. **VibraMID** system detects human emotions by the control of three dimensional (3D) head-neck movements and fluctuations, accumulated as frame difference in several video frames.

**VibraImage** system allows controlling macromovements (macrovibrations) as microvibration. Macromovements analysis uses the same principles as the control of micro-movements, at the same time it allows to monitor the status of the people in the crowd. Micromovements of human head cannot be seen without a technical system, but it was well known that movements and psychomotorics reflect emotional state of person since such behavioral reactions are well observed by psychologists and profilers. However, visual inspection of the movements is really subjectivity, at the time, as the vibraimage system macromovements control completely objective and is determined by the calculation formulas and the selected system configuration. The optimal camera location and the choice of checking place are determined with considering the lens parameters, the distance from the camera to the object and the amplitude of motion of the object.

When choosing the location of the TV camera relative to the investigated group of people is need to use the following recommendations:

- The maximum display of human on the frame is preferable, and the camera should not be moved from the investigated group.
- People in the investigated group must be approximately on the same distance from the television camera.
- In the analysis of the emotional state should use an equivalent comparison principle, the correct is a comparison of people making near the same motion, for example, feed the ticket compared with the person submitting the ticket, the person transposing luggage compare with a person committing the same act, etc.

**Note**, that in order to improve the accuracy of the human state measurement, recommends to control its movement in maximum details, therefore, observe the minimum number of people in the frame. Question of the measurement accuracy for the psychophysiological state should be decided separately for every controlled object. In this case, for more accuracy it is recommended to use personal control in MICRO mode for suspicious people detection in the high important places.

## 1.1. Basic applications

**VibraMID** is designed for technical profiling and detection of suspicious behavior person. **VibraMID** solves the following tasks:

- behavior detection of suspicious person in flow;
- passengers flow monitoring;
- macro movements control.

## 1.2. System specifications

### 1.2.1. Basic parameters

- Resolution, TVL, more than 400
- Noise level of VibraImage, bit, less than 0,1
- Frame speed, frame/sec, more than 25
- Frequency range, Hz, more than  $0,1 \div 10,0$

### 1.2.2. Digital (web) camera requirements

The camera is supplied upon customer's request.

- Sensor CCD or CMOS Sensor
- Resolution, pixel., more than 640 x 480
- USB and IP compatible USB 3.0.; USB 2.0.
- Frame speed, f/s, more than 25
- Microphone external
- Exposition control auto and manual
- Color mode color and B/W switch
- Flicker mode Flicker 50 Hz and 60 Hz

### 1.2.3. System requirements for local module computer

- Operation System Windows 7/8/10 or later **64 bit only**
- Processor Intel I3 2400 MHz or later
- RAM more than 4 Gb
- HDD more than 10 Gb free space
- USB port 1 free USB ports version USB 2.0
- Video capture WDM-compatible video device

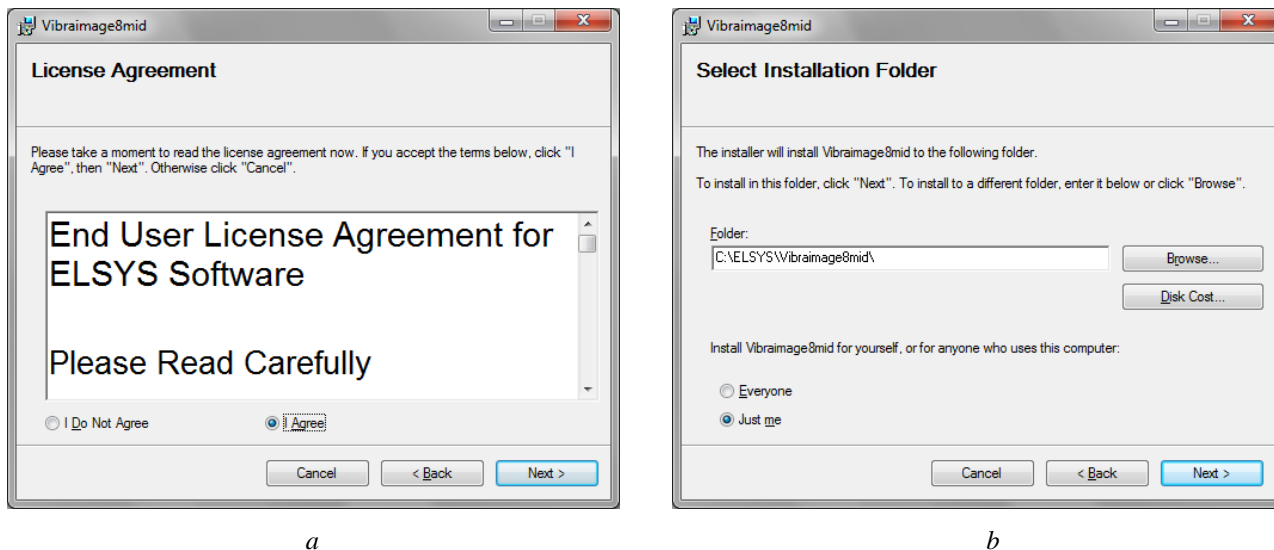
### 1.3. Package contents

1.	<b>Vibra</b> MID software	-	1
2.	Activation code	-	1
3.	User's manual	-	1
4.	Digital USB camera (option)	-	1
5.	Microphone (option)	-	1
6.	Personal computer (option)	-	1

## 2. VibraMID software installation

To install VibraMID please follow steps below:

1. Go to Web page <http://www.psymaker.com/support/downloads/>
2. Load file Vibraimage8mid.exe <http://www.psymaker.com/downloads/Vibraimage8mid.exe>
3. Run file Vibraimage8mid.exe from archive file
4. Press button «Next» in the appeared window of the beginning installation.
5. Accept the license agreement and to press button «Next» in the appeared window (fig.2.1a).



*Fig.2.1a – the license agreement, b – the catalogue choice for record of the program*

6. In the appeared window specify a way to the catalogue where files of the program will be written down, then to press button «Next» (fig.2.1b).
7. Press button «Next» in the appeared window, allows installation of software files on your computer.
8. Press button «Finish» at the end of installation.
9. VibraMID program pictogram appears after the end of installation in system menu and on desktop of your computer.
10. To reboot a computer.

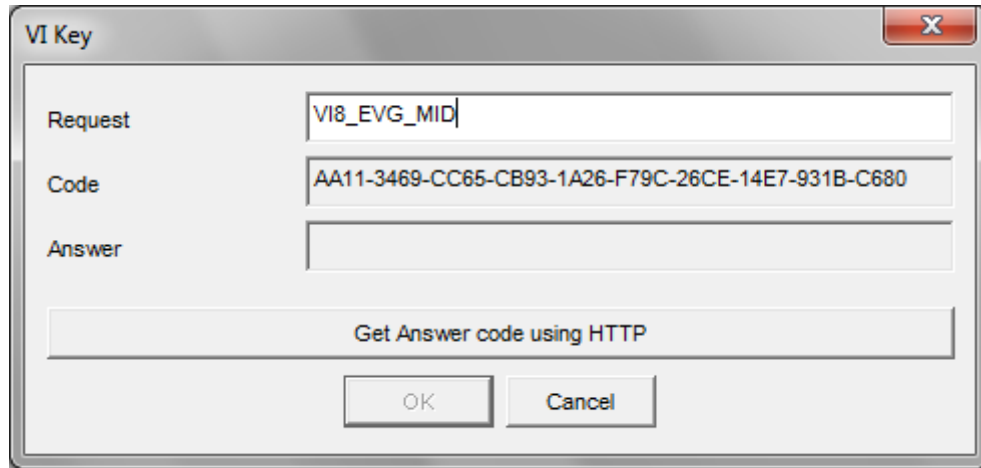
### 2.1. VibraMID software activation

#### Attention:

1. Procedure of activation is made only at the first start of the program.
2. Before the standard program activation is necessary to buy this modification of the program by online shop Psymaker <http://www.psymaker.com/store/>
3. Activation procedure requests access to the Internet for receiving answer code from server.
4. Activation code has the structure «VIXX\_XXXXXX\_MID».

### 2.1.1. Standard activation

1. To start activation it is necessary to get starts the program **VibraMID**.
2. At the first start of the program the activation window will be displayed (fig. 2.2).



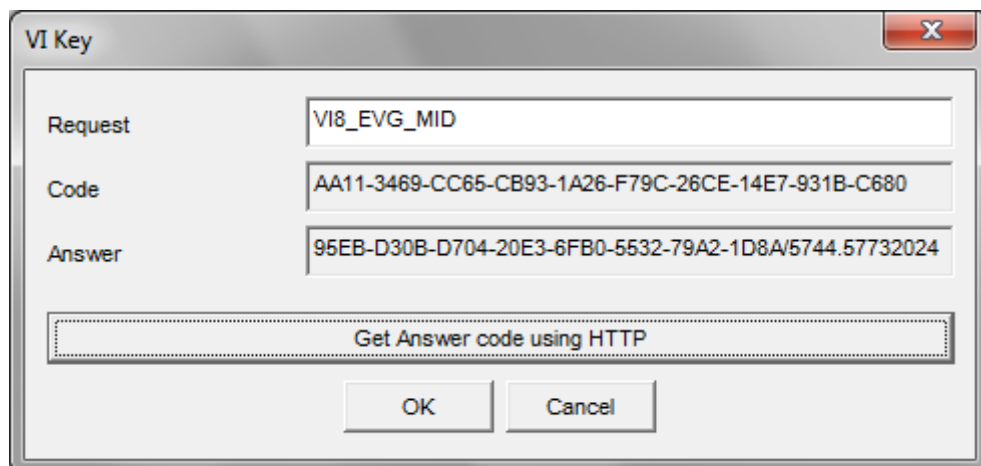
*Fig. 2.2. Activation window*

3. In the field «**Request**» it is necessary to enter the activation code received by e-mail or specified by the seller. After input of activation code to press the button «**Get Answer code using HTTP**».

**Attention!**

**Please, be careful and paste code without additional gaps!**

4. The activation code will be checked up through the Internet and, in case of successful end of activation procedure, the answer code will be sent (fig. 2.3).



*Fig. 2.3. Successful activation*

5. Press button «**OK**». **VibraMID** will be automatically started. After starting program you will see white screen (fig. 2.4).

## Attention!

The first launch must be carried out with administrator rights!

### 2.1.2. DEMO activation

Note, for each modification you have a possibility of the program start in the DEMO mode only 5 times. Then the Internet code is required to be bought.

1. To start activation it is necessary to get starts the program **VibraMID**.
2. At the first start of the program the activation window will be displayed (fig. 2.4).

*Fig. 2.4. DEMO activation window*

3. In the field «**Request**» it is necessary to enter uppercase letters of «**DEMO\_MID**» (fig. 2.4). After input of a demo activation code to press the button «**Get Answer code using HTTP**».
4. The activation code will be checked up through the Internet and, in case of successful end of activation procedure, the answer code will be sent and will be appeared in the field «**Answer**» (fig. 2.5).

*Fig. 2.5. Successful DEMO activation*

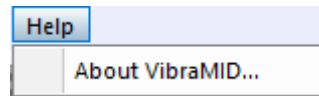
5. Further items 5-8 as in case «**Standard activation**» (see section 2.1.1).



## 2.2. Reinstallation of **VibraMID**

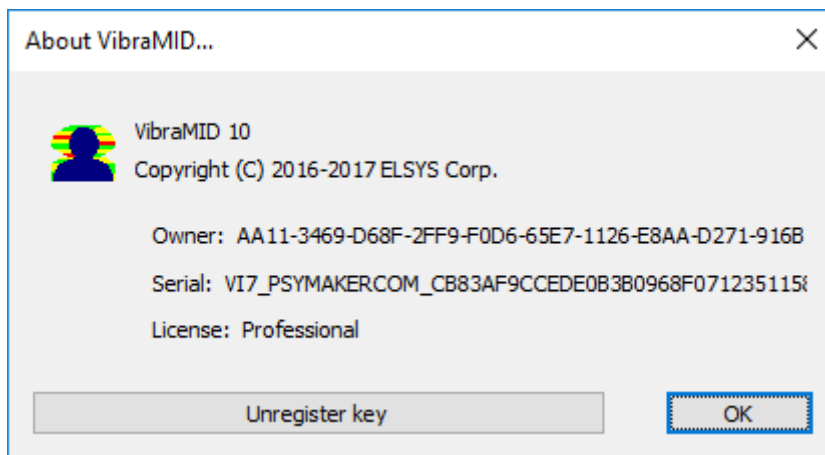
**Note**, the ability to reinstall chosen **VibraMID** on a new computer. This operation is also recommended before any upgrade SW or HW on PC. For this purpose it is necessary to execute the following actions:

1. To connect computer with **VibraMID** to the Internet.
2. To start **VibraMID**
3. In the menu «Help» choose item «About **VibraMID** ...» (fig.2.9).



*Fig. 2.9. Menu «Help»*

4. In the opened window to press the button «**Unregister key**» (fig.2.10).

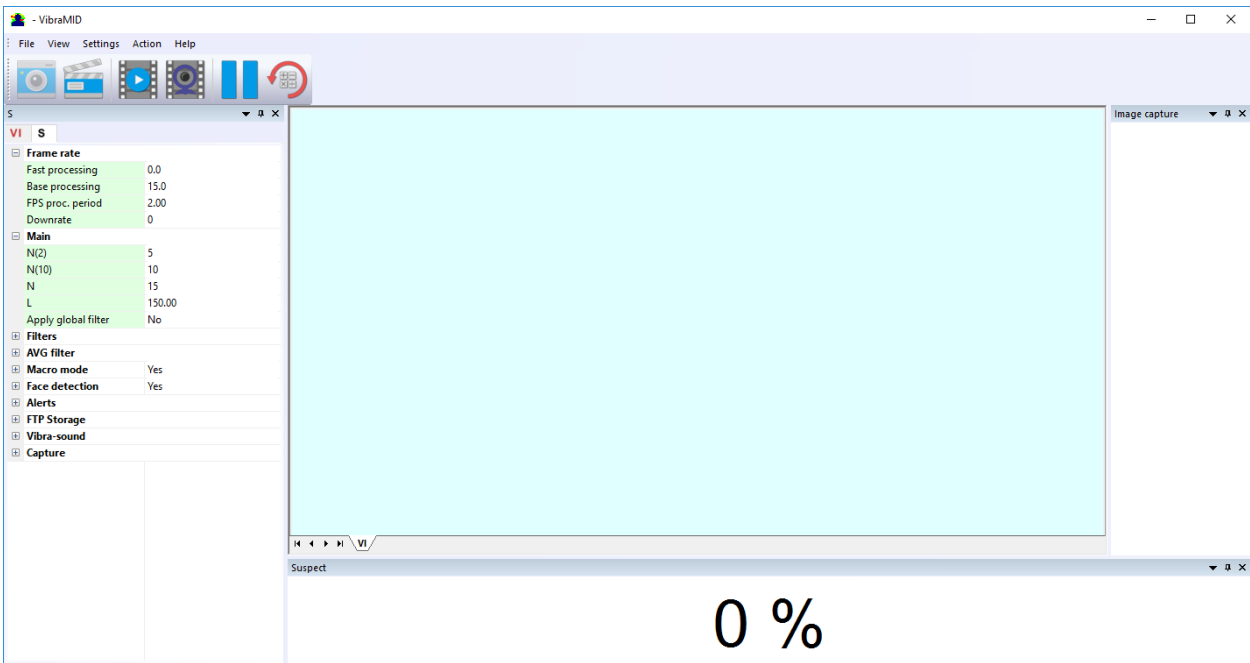


*Fig. 2.10. Information about **VibraMID***

5. Close the program.
6. Connect a new computer to Internet.
7. On the new computer to install the chosen program modification and to make registration of an «old» modification activation code through the Internet, according to recommendations of section 2.1.
8. After successful program registration the given activation code will be fixed to the given computer.

## 2.3 First start of **VibraMID** system

1. After the first start of system you will see the program window shown in fig. 2.11.



*Fig. 2.11. First program start*

2. In menu «**Settings**» => «**Language**» select interface language (fig. 2.12).



*Fig. 2.12. Select language*

3. Once connected to the computer camera in the menu "**Settings**" => "**Video**" (fig 2.13) you need to select the camera to work (in fig 2.13 -. Microsoft Lifecam Cinema camera).

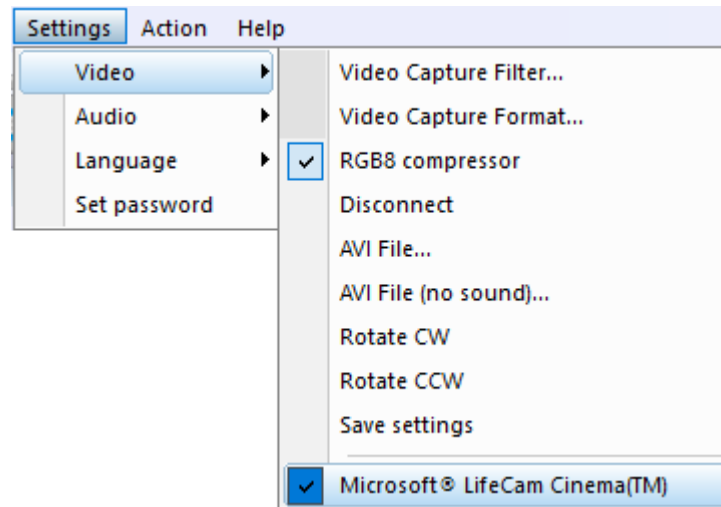


Fig. 2.13. Video camera connecting

4. After correct connecting the camera the image appears on the screen.
5. Perform video camera settings (see. ch. 2.4).
6. Perform quality control of videoimage and, if it is necessary, eliminate the causes of low-quality video.
7. Get started in accordance with the program description (ch. 4).

## 2.4 Camera's setting

### 2.4.1 Video camera choice

It is necessary to select in the main menu «Settings» => «Video» => «.../name used camera/...». In figure 2.11 the process of selecting the camera «Microsoft LifeCam Cinema» is shown. If the camera is connected, selected and works, then the left of the name there will be an icon «✓», and the menu will be extended with the «Video capture filter...» and «Video capture format...».

**Note,** use free program CamIP for the IP network camera connection ([http://www.psymaker.com/downloads/CamIP\\_installer.msi](http://www.psymaker.com/downloads/CamIP_installer.msi)). Parameter setting procedure is described in the CamIp manual [http://www.psymaker.com/downloads/CamIP\\_eng.pdf](http://www.psymaker.com/downloads/CamIP_eng.pdf)

### 2.4.2 Video capture filter

To open the menu of the camera settings you must be select «Video capture filter...» in the submenu «Video» (fig. 2.14). Item «Video capture filter...» appears in the menu only in case of the correct installation of drivers of the camera and a choice of the working camera.

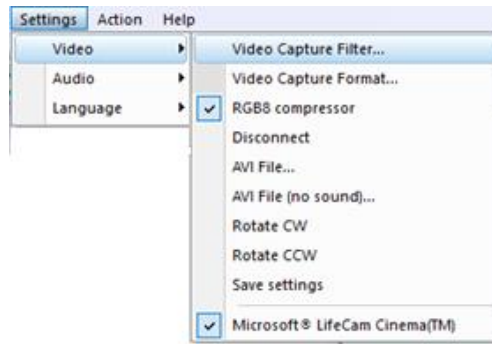


Fig. 2.14. Opening of the camera's settings menu («Video capture filter...»)

After a choice of the «**Video capture filter...**» the window «**Settings**» will open. Settings window differs depends on camera type. The first tab of this window is usually devoted to the image setup (Brightness, Contrast, etc.). In a figure 2.15 the window «**Settings**» for the camera «**Microsoft LifeCam Cinema**» is shown. Camera Microsoft LifeCam Cinema has low noise level and is preferable for vibraimage applications among webcams.

«Brightness», «Contrast» and other parameters should be set up so that image of object has more contrast. Switching on/off flicker-effect from artificial lighting could be necessary for some illumination types.

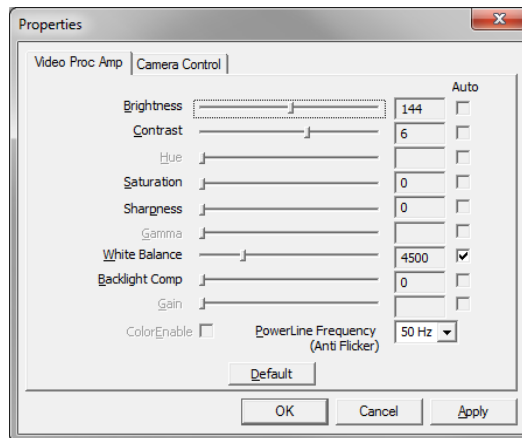


Fig. 2.15. Video setting, camera « Microsoft LifeCam Cinema»

After a choice of the «**Video capture filter...**» the window «**Settings**» will open. Settings window differs depends on camera type. When adjusting the camera settings, you must fulfill the following general requirements:

- The «**Brightness**», «**Contrast**» and others parameters should be configured so that the image of the object was the maximum contrast
- Switch on «**Flicker**» mode for setting lighting power line frequency (repayment flicker); in most countries it is 50 Hz.
- If your camera supports, then switch on the black-and- white image «**B/W mode**». If the camera works only in color mode, it is recommended to set «**Saturation**» parameter to minimum value.
- Depending on the experimental conditions and light to use automatic or manual setting «**Exposure**» parameter. If constant lighting, it is recommended to use the

manual adjustment. If changes (for example, an object depends on the lighting street lighting), it is better to use the automatic adjustment mode setting.

- Parameters «Zoom» and «Focus » is recommended to use in the manual mode and change their values not due to electronic image processing, but by approaching / removing the camera from the object. The «**Scale**» (Zoom) is recommended to select based on two factors. Firstly you need to have maximum image size of control object and it is preferably to stand maximum zoom level. From the other side high level of electronic zoom in some cameras could go down the frame rate and it is necessary to control this parameter and fixed frame rate more than 25 f/s. Therefore, for webcam Microsoft LifeCam Cinema the optimal meaning of zoom for personal control is 4. For other cameras is possible to adjust other optimal zoom settings.

### 2.4.3 Video capture format

To open the menu of the camera settings you must be select «**Video capture filter...**» in the submenu «**Video**» (fig. 2.16). Item «**Video capture format...**» appears in the menu only in case of the correct installation of drivers of the camera and a choice of the working camera. Frame rate is necessary to set 30 and the frame size to set («Output Size») 640 x 480 elements (fig. 2.16).

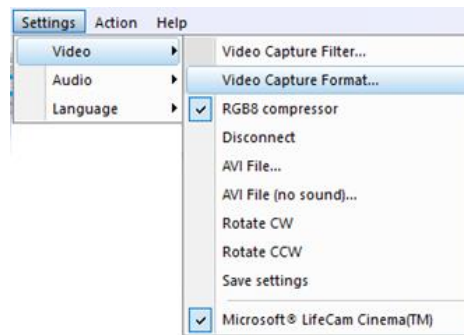


Fig. 2.16. Opening the settings window «Video capture format»

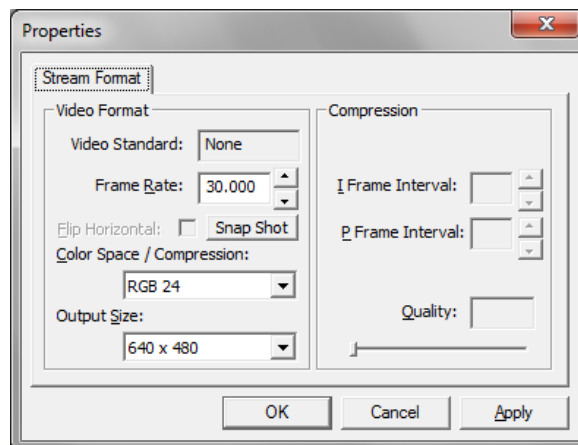


Fig. 2.16. Window «Video capture format»

**Note**, when changing camera settings in the program **VibraMID** frame rate «In» should be in the range of 25 - 30 frames/s. The parameter IntegratedN (Am) must be minimum, but not exceeding 0.1.

### 3. VibraMID. User's manual

After start of VibraMID in the main window there is an image from connected video device.

#### 3.1 Main window

In heading of the basic window the following information is indicated (see fig. 3.1):

- type of video source: Video camera or AVI file;
- model of video source: Video camera model or AVI file name;
- name of running VibraMID module;
- name of the current database record to which there is an operation.

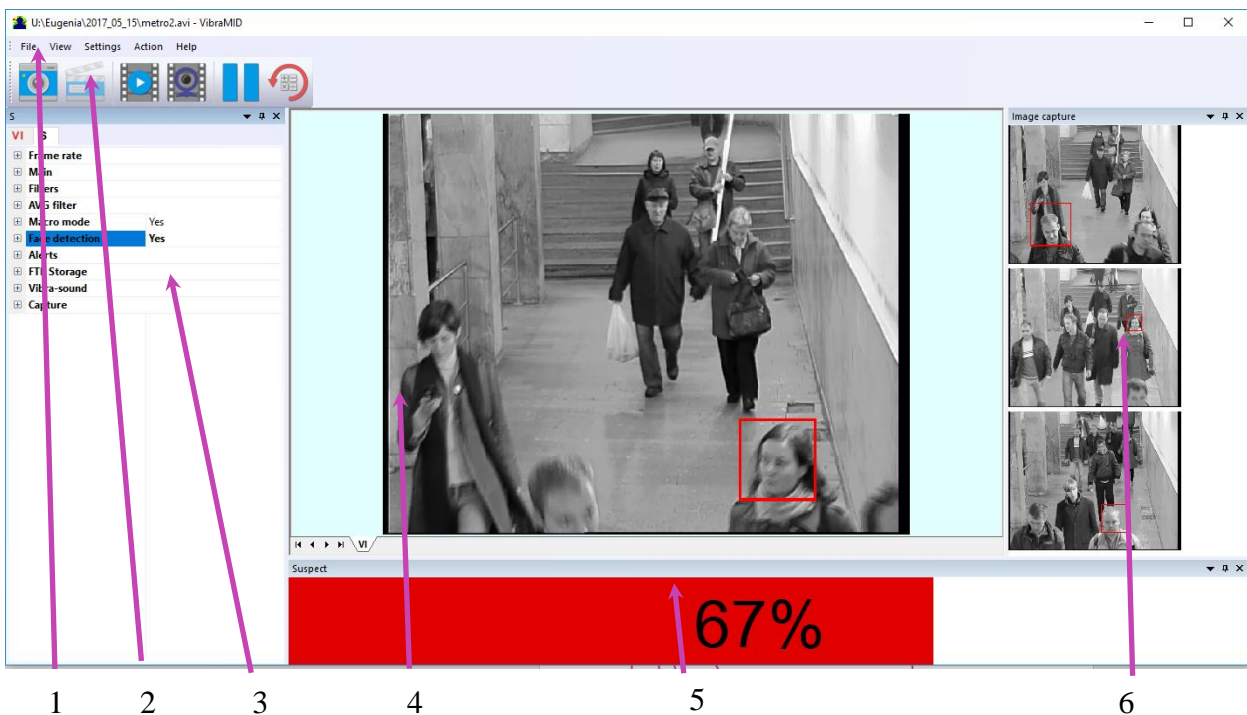
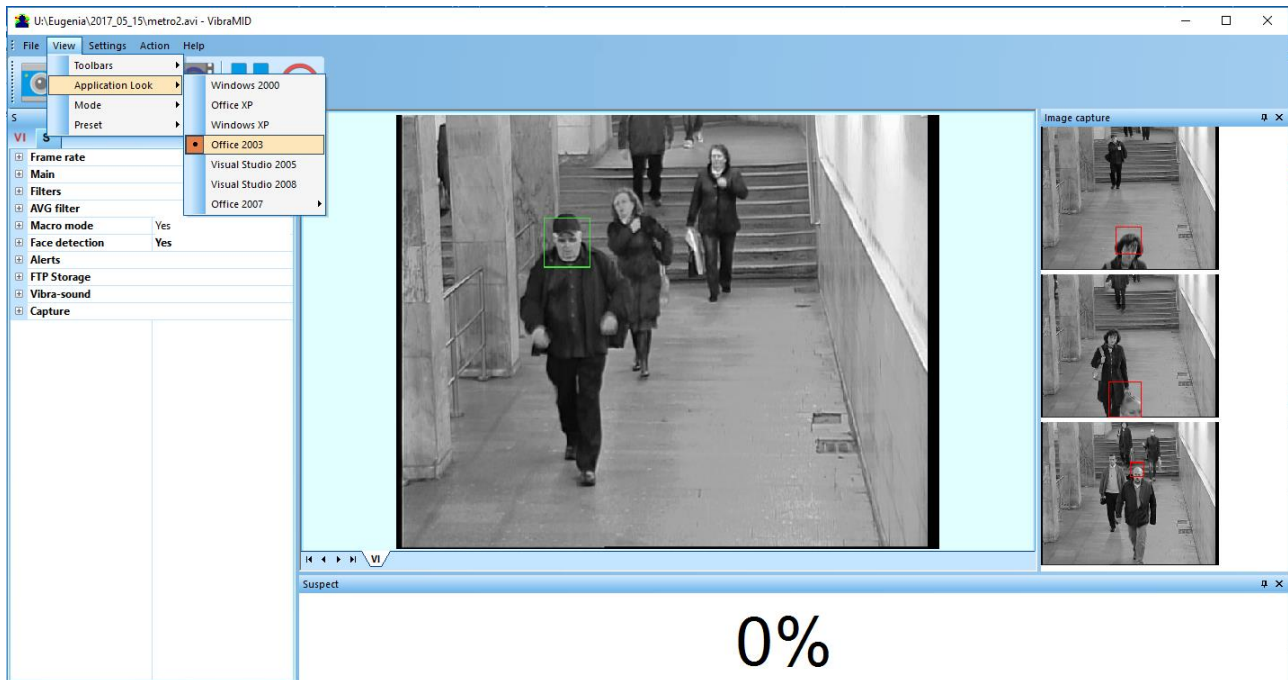


Fig. 3.1. Main window VibraMID

The program for the user's convenience have the ability to change the style of the main elements of the working window. To change the style, use the submenu «View» - «Application Look» (fig. 3.2.).



*Fig. 3.2. Style «Office 2003»*

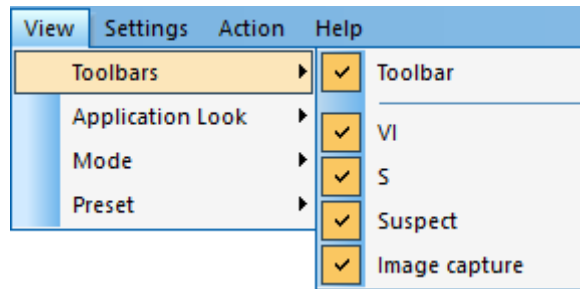
### 3.1.1 Basic window design

In total in the main window of the program in addition to the video area, you can see an additional 7 windows that display information about the parameters of mental and emotional state of a person, and program settings (on fig 3.1 the windows labeled corresponding numbers):

1. File, View, Settings, Action, Help – main menu;
2. Toolbar – main toolbar;
3. VI, S – information panel windows;
4. Images window for displaying vibraimages (VI);
5. Suspect – human suspect level window;
6. Image capture – window for «danger» person photo.

User can add or delete windows by submenu «**View**» - «**Toolbar**» (fig. 3.3).

**Note**, double click by the left button of a mouse in the image field of makes **RESET** of all saved up information and statistics about frames and start new cycle collection of information.

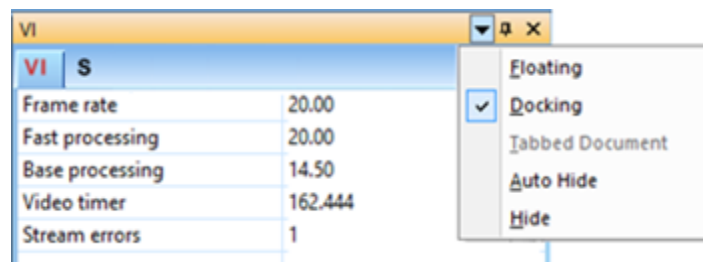


*Fig. 3.3. Submenu «Toolbars»*

### 3.1.2 Windows position control

The user can control the placement of additional windows on the screen and the size using the controls elements on the left side of each window title. For each window it is available control menu (fig. 3.4). This menu also appears when you click the left mouse button in finding the mouse pointer in the desired window. In «Docking» mode, window position and size are fixed, and when opening/closing the window will open in a given position. The mode «Floating» window position and size can be changed by the user.

If the window is in a random location on the screen, then double-click the left mouse button on the window, the window will move on the screen in the «default» position.



*Fig. 3.4. Window control element*

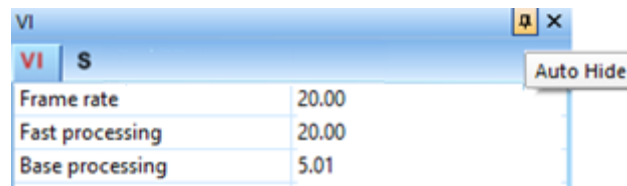
Each window can be closed, or by using the window menu or by using a separate control element (fig. 3.5).



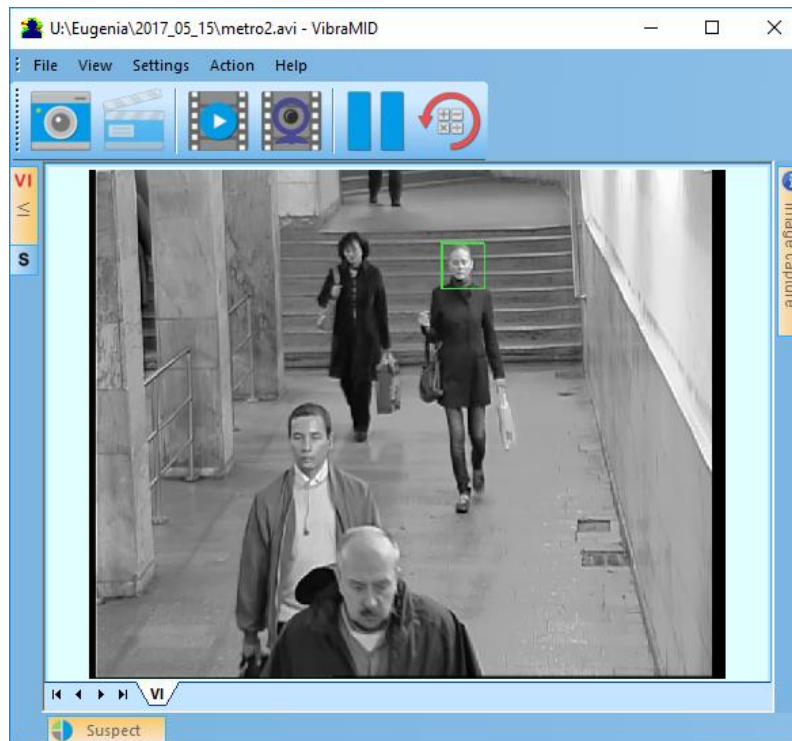
*Fig. 3.5. Control element «close window»*

Each window can be temporarily minimized and moved to the border of the main program window (fig. 3.6). Figure 3.7 additional windows hided and moved to the border of the main window and they icons are highlighted in orange color.





*Fig. 3.6. Control element «hide window»*



*Fig. 3.7. All additional windows are hide.*

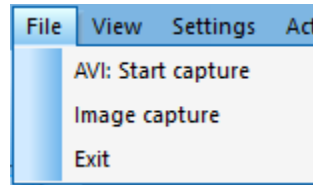
## 3.2. Main menu

The main menu contains the following items:

- «File»
- «View»
- «Settings»
- «Action»
- «Help»

### 3.2.1 Menu «File»

Menu «**File**» (fig. 3.8) contains following items:



*Fig. 3.8. Menu «File»*

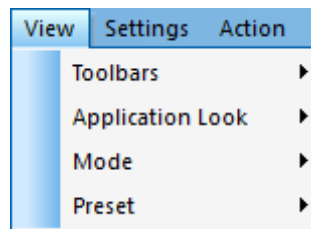
Item «**AVI: Start Capture**» - start record AVI-file. If the database folder is not specified, record of AVI files is blocked.

Item «**Image capture...**» - saving the current frame of a window in the database folder.

Item «**Exit**» - exit from program.

### 3.2.2 Menu «View»

Menu «**View**» (fig. 3.9) defines visible in the basic window information and contains the following items:



*Fig. 3.9. Menu «View»*

Item «**Toolbars**» - switch on/off the toolbar (fig 3.3).

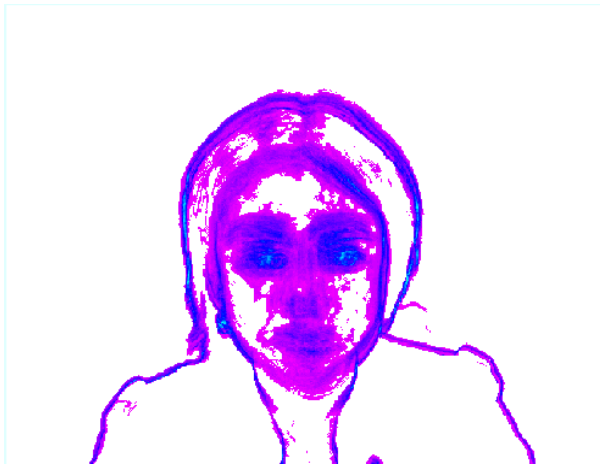
Item «**Application Look**» - choose style of program (fig 3.2).

Submenu «**Mode**» defines additional configuration and number of windows with an image displayed in the image area.

Submenu «**Preset**» defines the type of the display image:

Item «**Preset**» menu «**View**» (Fig. 3.10) intended to choice one basic mode in image area.

- In «**VI**» mode [«VibraImage mode»] displays vibraimage of person. Color for every image pixel depends on its amplitude or frequency of vibrations (fig. 3.10a).
- In «**LD**» mode [«Lie Detector mode»] image area shows real object image(fig. 3.10b).



3.10a Mode VI



3.10b Mode LD

3.10 Image area in different modes

### 3.2.3 Menu «Settings»

Menu «**Settings**» (fig. 3.12) allows choosing video or audio source, language, settings by default and auto start program:

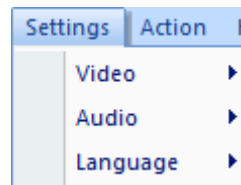


Fig. 3.12. Menu «Settings»

**VibraLie** allows to process «live» video signal coming from a video camera and video data recorded before and saved as AVI-file. The system works with a signal from a video camera by default.

Submenu «**Language**» allows to select interface language (See par. 2.3).

#### 3.2.3.1 Video source choice

Submenu «**Video**» contains settings of video modes. It can differ depend on connected devices. For example, this menu contains the following items (fig. 3.13). You can choose as video source one from many installing in PC video-devices or load external video file.

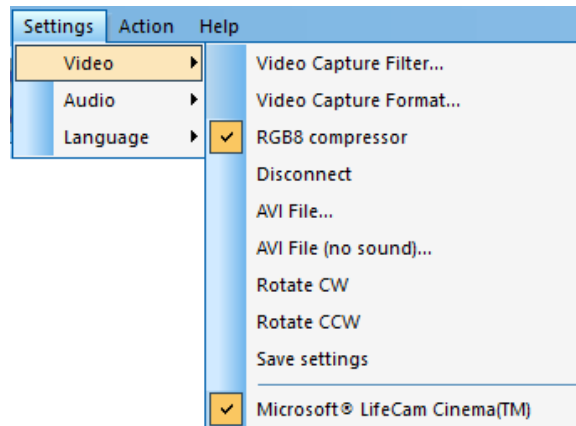


Fig. 3.13. Submenu «Video»

Subitem «**Video Capture Filter...**» - by pressing the window of video device setting (contrast, exposition, brightness) opens. Each device has the especial window of settings.

Subitem «**Video Capture Format...**» - change video capture format.

Subitem «**RGB8 compressor**» are intended for management of a videofile record format. If this item is chosen, that, for economy of a space on a hard disk, the videofile saved in a black-and-white format.

Subitem «**Disconnect**» allows to disconnect all videocamera or videofile

Subitems «**AVI File...**» and «**AVI File (no sound)...**» [AVI File (no sound)...] are intended for selecting for the analysis of an external video file

Subitems «**Rotate CW**» and «**Rotate CCW**» allow allow to make turn of an input video image on 90 and 270 degrees before its processing in the VibraLie.

Subitem «**Save settings**» allows to save current camera settings in the Windows registry in order to load them at next startup programs with this camera

The bottom menu allows you to choose a used device video capture from multiple installed on this computer.

### 3.2.3.2 Audio source choice

Submenu «**Audio**» contains settings of audio modes. It can differ depend on connected devices. For example, this menu contains the following items (fig. 3.14). You can choose as video source one from many installing in PC video-devices or load external video file.

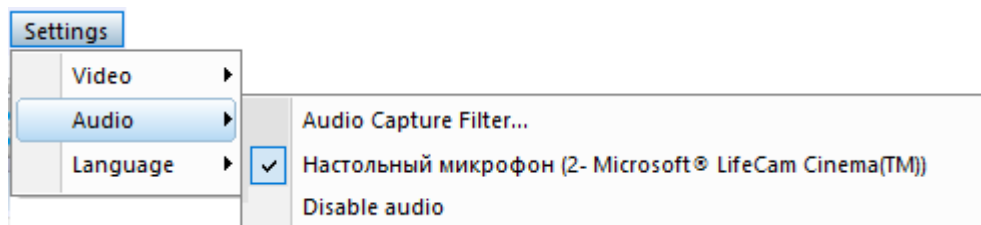


Fig. 3.14. Submenu «Audio»

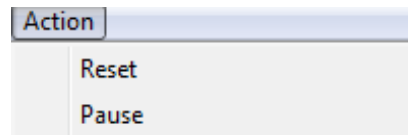
Subitem «**Audio Capture Filter...**» - the window of audio device setting. This subitem exist only when you choose videosource. Each device has the especial window of settings.

Subitem «**Disable audio**» allows disconnecting all audiosource.

Menu between these subitems allows choosing used audio device capture from multiple installed on this computer.

### 3.2.4. Menu «Action»

Menu «**Action**» (fig. 3.7) contains the following items:



*Fig.3.7. Menu «Action»*

Item «**Reset**» – reset all saved up information and statistics about frames and start new cycle collection of information.

Item «**Pause**» – stop last accepted frame of data in image area of windows.

### 3.2.5 Menu «Help»

Menu «**Help**» (fig. 2.9) is in the main menu on the right side

Item « **About VibraMID...**» is intended to view the software version, the registered user name (Owner), the key number protection (Serial) and expiry date of the license (Limited) (fig. 2.10).

Use «**Help**» command to call the help system.


## 3.3. Toolbar

Toolbar of **VibraMID** shown on the fig. 3.8.



*Fig. 3.8. Toolbar of VibraMID*

Tools panel of **VibraMID** program includes functions corresponding to buttons on the Tools panel from left to right:

-  - “Save current image” (Menu “File”);



- “AVI: Start Capture” (Menu “File“). For stop AVI files recording needs push on this button again R – reset all accumulated information about frame difference.



–AVI files download for PDD analysis;



– live video camera connection;



– pause on image and program operations;



– reset all accumulated information about frame difference. Start accumulation again after reset (Menu «Action»).

### 3.4. Information column

Indication of information column (fig. 3.9) depends on using mode:



*Fig. 3.9. Modes of the information column*

- In the mode «VI» information about adjustments of system and results of data vibraimage processing is displayed;
- In the mode «S» settings of basic parameters for vibraimage processing are configured.

**Note,** values of parameters in fields which are allocated by a green font, can be changed by the user (fig. 3.10, parameters N, K, L – it is possible to change in Information table). For this purpose it is necessary to bring the mouse pointer to the chosen field and twice to click the left button of a mouse.

### 3.4.1. Information column. VI mode

In the mode «**VI**» information panel (fig. 3.10) displays following information:

VI	
Frame rate	29.96
Fast processing	29.96
Base processing	4.97
Video timer	3732.65
Stream errors	113
[-] Info	
N	100
L	2
Width	640
Height	480
[-] Statistics	
IntegratedN(Am)	6.385629
IntegratedN(F)	6.439371
Critical level %	60.0 %
Suspect	17.9
Aggression	22.1
Stress	23.0
Tension	9.1
[-] Audio	
Level	0.0

Fig. 3.10. Information column in the VI mode

#### Frame rate:

- «**In**» – Number of the frames per second, received from the video source;
- «**Fast processing**» – Maximum number of the processed frames per second used for calculation. Selected by user;
- «**Base processing**» – Number of the processed frames per second used in base algorithm. Selected by user;
- «**Video Timer**» – For camera mode-displays time of supervision. For recorded video - time of current video-file record. For viewing a video-file - time from the file beginning);
- «**Stream errors**» – The counter of mistakes which increases if time between the next accepted frame unstably. This mistake can arise, if productivity of a computer suffices or poor-quality video is loaded;

#### Info:

- **N** – Number of the frames for accumulation. Selected by user;

- **L** – Palette Threshold. Defines a threshold in the displayed image, value of brightness less threshold is considered «black». Selected by user;

**Width** and **Height** – Displays the current video camera or avi file resolution;

**Statistics:**

- **IntegratedN(Am)** – Average frame amplitude vibraimage intensity processed for the N frames;
- **IntegratedN(F)** – Average frame frequency vibraimage intensity processed for the N frames;
- **«Critical level %»** – Threshold of a psychoemotional status of the person exposed in % in case of which exceeding on the remote terminal the warning message will be issued;
- **«Suspect»** – Calculated level of suspect for object in frame;
- **«Aggression»** – Calculated level of anger for object in frame;
- **«Stress»** – Calculated level of stress for object in frame;
- **«Tension»** – Calculated level of tension for object in frame;

**Audio:**

- **«Level»** – current level of audio signal.

**Statistics:**

- **IntegratedN(Am)** – Average frame amplitude vibraimage intensity processed for the N frames;
- **IntegratedN(F)** – Average frame frequency vibraimage intensity processed for the N frames;
- **«Critical level %»** – threshold of a psychoemotional status of the person exposed in % in case of which exceeding on the remote terminal the warning message will be issued;
- **«Suspect»** – Calculated level of suspect for object in frame;
- **«Anger»** – Calculated level of anger for object in frame;
- **«Stress»** – Calculated level of stress for object in frame;
- **«Tension»** – Calculated level of tension for object in frame;

**Audio:**

- **«Level»** – current level of audio signal.



### 3.4.2. Information column. S Mode

Information column in the mode of parameters settings (fig. 3.11) allows adjusting vibraimage parameters and displays the following information:

#### Frame rate

Fast processing	Frequency (fps) for processing «fast» parameters of vibraimage, noted by a word «fast»
Base processing	Frequency (fps) for processing «base» parameters of vibraimage, noted by a word «base»
FPS proc. period	Frequency of the frames (fps) during calculation period
Downrate	Reduce input frame rate. At value 3, will be processed every third frame.

#### Main settings

N(2)	Minimum number of accumulated frames. By default, 2
N(10)	Average number of accumulated frames. By default, 10
N	Maximum number of accumulated frames. By default, 100
L	Threshold of a palette. Defines a threshold of displayed image, value of less brightness considers as «black».
Parallelization	Parallel number of processing in multi core systems. Default 0 – for Core 2 Duo.
Apply global filter	If this parameter is included, all the remaining calculated parameters change on processed by filters.

#### Filters

Single points	Removes single points, surrounded by black
Extended	It is intended for reduction of noise of a video camera. Delete video noise in bit. By default, 8. This filter is important, when the object is motionless, and values changed because of camera noise.
Extended (fast)	Delete video noise for fast processing.
Stretch	Scale normalization filter to a range 0 – 255 after its «trimming» by filter « <b>Extended</b> »
Max speed contour	At the included mode, calculation fast parameters are made only inside of aura contour, at switched off - on the whole frame.
Am scale	Multiplication factor used for vibraimage visualization in a «amplitude» mode

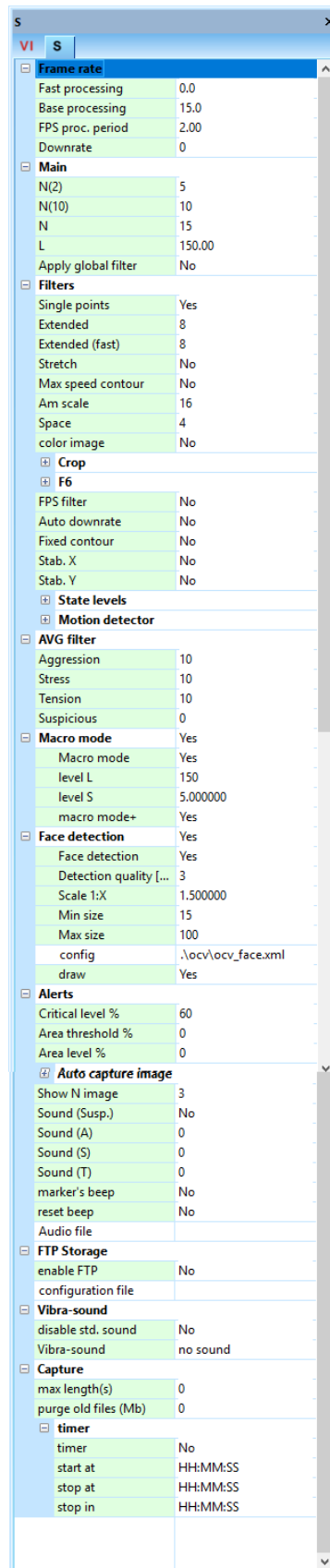


Fig. 3.11. Information column. Mode of parameters settings.

Space	<p>Reduce vibraimage on borders of motionless contrast objects. Frame difference <math>D(x, y)</math> is multiplied by the factor <math>K</math></p> $K = (1 - (SV * MB) / 100);$ <p>where <math>SV</math> – parameter of the filter, <math>MB</math> – the maximal difference between levels of brightness of a point <math>(x, y)</math> and the next points in the initial image</p> <p><b>Not:</b></p> <p>Switching off filters accelerate the computer functionality. Advanced user could switch filters from default settings.</p> <p><b>Attention</b>, switching-off below parameters calculation could automatically stop calculation and sets of other characteristics which used values of the switched off parameter.</p>
Color image	No – Black and white real image in image area. Yes – color image in image area.
Crop X, Crop Y	If real image size more than 640x480 pixels, than will be use only 640x480 pixels from center part of image.
Crop X pos, Crop Y pos	When cropping images define the coordinates (position of the upper-left corner) of the clipping region
F6 HF	Sets in % frequency of a cut for the filter of high frequencies at processing F1_fast parameter.
F6 LF	Sets in % frequency of a cut for the filter of low frequencies at processing F1_fast parameter.
F6 N	Number of averaging frame at calculation of F6 parameter
FPS filter	It is used for exact synchronization with a binding to the concrete frame at work with AVI files. Frequency of the input frame from the camera divided on set Base processing frequency and for processing will undertake each N frame.
Auto downrate	Automatic calculation of «Downrate» parameter is made in view of frequency of the input frames, Base processing frequency and computing capacity of a computer.
Fixed contour	In this mode vibra-aura around the human contour will be built around a fixed path, and not to repeat the contours of the body.
State levels Ag, St, Tn	Suspicious level in the Aggression parameters (Ag), «Stress» (St), «Tension» (Tn) is set. When exceeding level of danger the system gives out a sound signal and fixes a frame.
<b>Motion detection</b>	
Motion detector	Delete emotion calculation for object with motion amount less than threshold
Level	Threshold level of Integrated10 for emotion calculation.
Auto reset	Reset emotion calculation for macro movement

Skip frames                      Skip frames with the frame difference more than threshold.

### **AVG filter**

Anger                              Number of frames for aggression level averaging  
 Stress                             Number of frames for stress level averaging  
 Tension                          Number of frames for tension level averaging  
 Suspicious                       Number of frames for suspect level averaging

### **Macro mode**

Macro mode                      Define on base of which formula danger level calculated. NO – danger level calculated on base of Anger, Stress and Tension levels. YES - danger level calculated on base of P13, P14 and P15 parameters values.  
 Level L                            Threshold of a palette for danger calculation only (not for displayed image. threshold of displayed image define parameter L). Value of less brightness considers as «black» and not used in danger calculation.  
 Level S                            Threshold of a area (in % from full frame square). Defines area of «active brightness» pixels. If area of pixels (in %), which brightness more than «Level L» value, less than «Level S» value, than danger parameters in Status window equal 0.  
 Aura mode                        Reserved for future use  
 Macro mode +                    Yes - the danger level is considered for every single person in the frame.  
    No - the danger level is averaged over the entire frame.

### **Face detection**

Face detection                    Yes- face detection mode is used. No – without face detection  
 Detection quality                Quality of face capture. 1 – capture one large person face in the frame (loading of the processor is minimal), 4 - search of all (even small) persons face in the frame (loading of the processor is maximal).  
 Scale 1: X                        Sets the aspect ratio of the picture before detection of persons  
 Min size                          Sets in pixels the size of rectangle for search of persons  
 Max size  
 Config                            The program gives the user an opportunity of loading the new algorithms of person search. In the given line the path to a file of new search algorithm is displayed. In more detail procedure of loading of new algorithm is described in section 6.2 " Macro Mode»

**Draw** No – not draw rectangle around face, Yes – draw rectangle around more danger single person, All – draw rectangle for all danger person in frame. For non-danger person rectangle draw green color, but if person suspect level more than «Critical level», than rectangle draw red color.

## Alerts

**Critical level** Stands critical level of emotion parameters for alarm signals

**Area threshold%,  
Area level %** Used to account for the small area factor of moving objects relative to the frame area during the suspect level calculation.

## Auto capture image

**Auto capture image** At excess of the set level psycho-emotion danger in the specified catalogue will automatically saved BMP files of the «dangerous» person from display screen. Record will be made one time for the specified quantity of seconds.

**Save image files** Determines whether stored in the database directory photo file of "dangerous person " or not.

**Save face XML** Suspicious person face's data (fig. 3.12 c)

**Save faces** Image with a detected «suspicious» person in frame (fig. 3.12 b)

**Save original** Original image (fig 3.12 a)

**Show N image** At work in Macro mode in «Capture window» will be consistently displayed N images of «dangerous» objects, but if for the specified interval of time has passed some «suspicious» objects.

**Sound (Susp)** Defines, the sound signal will be used at work if “danger” person appear or not.

**Sound (A), Sound (S),  
Sound (T)** Level for sound of a audio signal at excess of aggression, stress or suspect levels the setting limits.

**Maker's beep** On/Off maker's beep in LD mode

**Reset beep** On/Off reset sound beep.

**Audio file** Choice of audio file

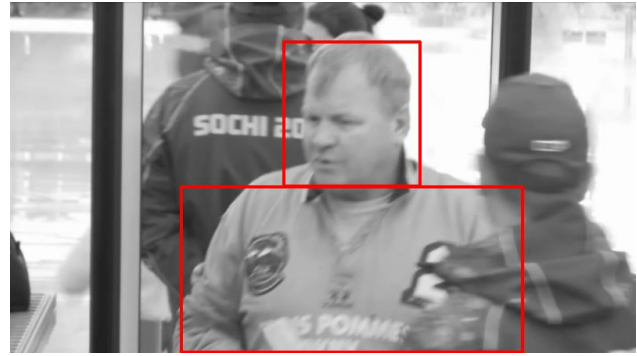
**FTP storage**

**enable FTP** Switch on/off FTP (Enable FTP = Yes, disable FTP = No)

**configuration file** Choosing FTP configuration file (".xml" file in catalog of program \Elsys\VibraImage10\ftp\)



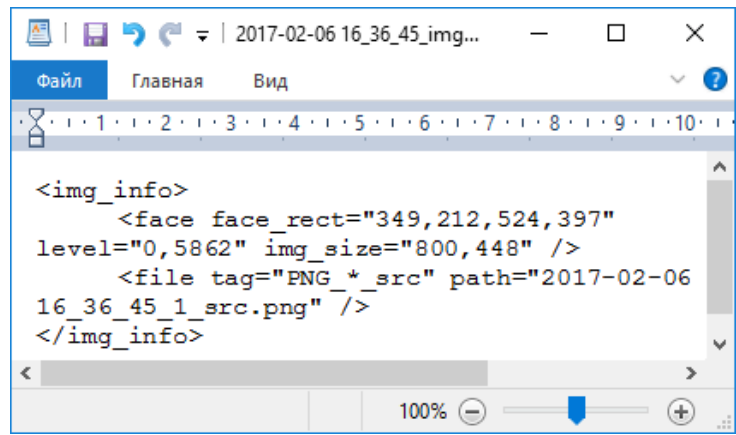
a) Original image



b) Image with a detected «suspicious» person in frame



c) «Suspicious» person face



d) Suspicious person face's data

Fig.3.12 Result files of Macro mode

Suspicious person face's data file Fig.3.12 (d) includes the following information

**<face face\_rect="274,127,461,326 "** – facial coordinates in pixels of left down and right up points from the frame;

**level="0,631029"** – suspicious level of captured person;

**img\_size="640,480" />** frame size in pixels.

## VibraSound

	YES - VibraSound mode is switch on.
Disable std. sound	NO - VibraSound mode is switched off, the sound acts either from a microphone or from a video file.
Vibra sound	<p>To switch on the VibraSound must select one of the values <b>CG, CR, HG, HR, SG, SR</b></p> <p>If one of these items is chosen than VibraSound sound will be switch on and will be modulated by curves of signal change in one of frequency distribution windows (fig. 3.57). Letters C, H, S define, from what window the signal for «sound» will be used: C - the first window, H - the second, S - the third.</p> <p>Letters G and R – show what color of graph will define «modulation» of a sound: G-green color, R - red color.</p>

## Capture

Max length (s)	Defines the maximal length (in seconds) for recorded video file. After file limit finished and closed, a new file creates.
Purge old files	Defines system action when the empty space on a hard disk will finish. «YES» – the oldest video files will be removed.
Timer	The system can begin record at the appointed time.

## 3.5. Save of measurements results

In the information panel of «S» mode there are few tabs (Alerts, Auto Capture Image, FTP) for saving photos and data.

### 3.5.1. Saving of suspicious person photos and data


**VibraMID** program atomatically creates files in the directory “C:\Users\user\Documents\MID Result” by\_default.

In this catalog there are following files:

<b>YYYY-MM-DD HH_MM_SS_org.png</b>	Original image (Fig. 3.12 a)
<b>YYYY-MM-DD HH_MM_SS _1_src.png</b>	Image with a detected «suspicious» person in frame (Fig. 3.12 b)
<b>YYYY-MM-DD HH_MM_SS _face.png</b>	«Suspicious» person face (Fig. 3.12 c)
<b>YYYY-MM-DD HH_MM_SS _img.xml</b>	«Suspicious» person face's coordinates (Fig. 3.12 d)

where YYYY – year, MM – month, DD – day, HH – hour, MM – minute, SS – second of photos creating.

### 3.5.2. Save of video file

Save of the current image, which appears in the basic window, in format AVI file is carried out with the help of a command «**AVI: Start Capture**» menu «**File**». Stop AVI- file recording process is carried out repeatedly selecting this menu item. The same actions can be executed with the help of the corresponding button  of the toolbar.

For increase of video files recording reliability designed the field «**Capture – max length (s)**» (records in seconds). If record lasts over the specified interval current AVI the file will be closed and save on a disk and record will be continued in a new file. At filling the whole disk if the switch «**Capture – purge old files**» record of new video-files will be made atop of old. The first «oldest» will leave by date of creation video-files.

### 3.5.3. Save of results and settings files

**VibraMID** program allows to save in an external file, results of measurement and processing of integrated intensity of image pulsation for some time interval. Saving of values sequence for integrated vibraimage characteristics, received for the certain time, in a file of the report is carried out automatically at record of video file. The user can define type and a format of a file in which reports will be made:

- extension \*.xml – viewing of file contents report is carried out by program Microsoft Excel;
- extension \*.txt – an ordinary text file, which contains the same information, as in file XML, only in the other format of representation.

**NOTE**, that save of parameters carries events character i.e. as soon as value of parameter is calculated by system, it save the name in a file, therefore, sequence of parameters records in a file is not fixed as some parameters demand more often calculation, than others.



In addition the user can save in file with extension \*.set system settings at the moment of the beginning of information gathering.

In addition the user can save in an external file with extension \*.xml system settings at the moment of the beginning of the information analysis.

Item «**Save settings as ...**» the menu «**File**» is intended for saving the current system settings to external XML file.

Item «**Load settings ...**» is intended for loading before saving settings from external XML file.

### 3.5.4 Sending images to a remote server

Perform the following steps for getting photo of suspicious person on your remote server.

- 1) Create a ".xml" file in catalog of program \Elsys\VibraImage10\ftp\ as an example of FTP configuration file in your catalog (fig. 3.13)

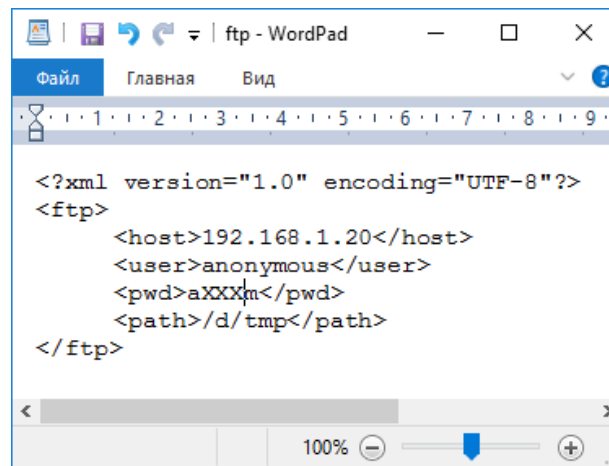


Fig. 3.13. Example of FTP configuration file

On fig 3.13:

<host>127.0.0.1</host> – address of server where you want to save photos and data;

<user>anonymous</user> – FTP user name;

<pwd>aXXXm</pwd> –FTP password;

<path>/d/tmp</path> – path to the database folder on FTP server for saving photos.

- 2) Choose FTP configuration file in the information panel in «S» mode in tab «**FTP**» => «**Configuration file**». (fig. 3.14).

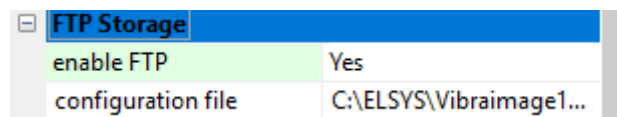


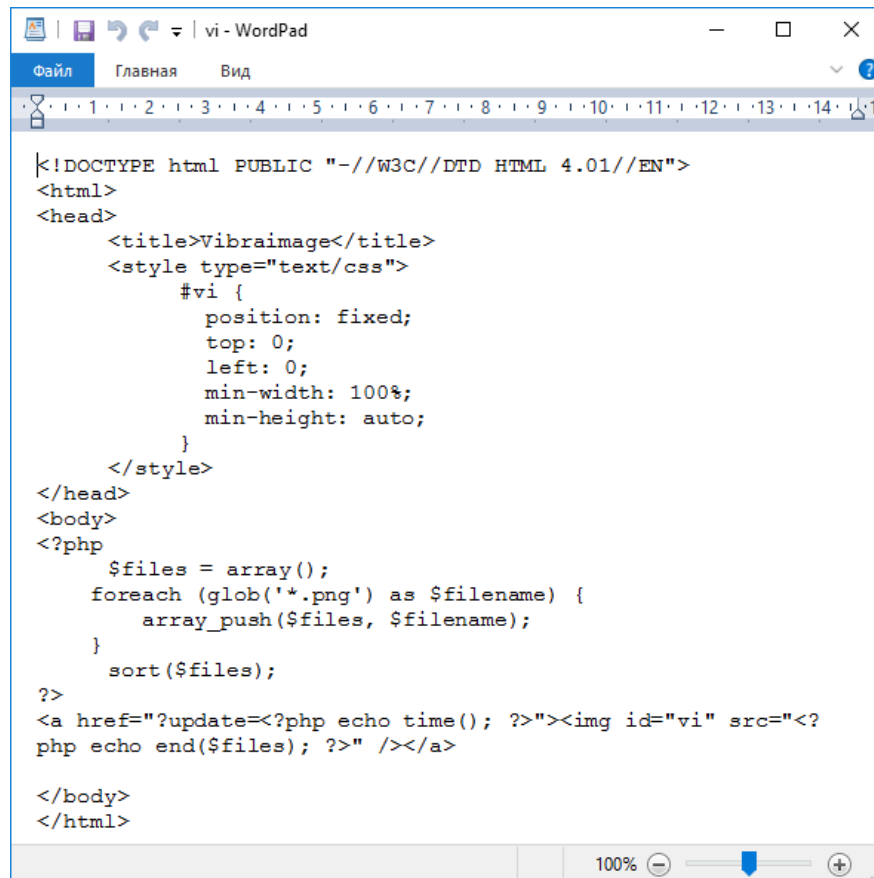
Fig. 3.14. Information panel in S mode. FTP storage.

- 3) Switch on FTP (Enable FTP = Yes) .

- 4) Check that images with a detected «suspicious» person in frame get to the FTP server (in example - /d/tmp).

### 3.5.5 Example of getting images on mobile phone

- 1) Configure FTP as described in p. 3.5.4.
- 2) Create a ".php" file to your site or server (in example to elsys.ru/1/) as an example «vi.php» in catalog of program \Elsys\VibraImage10\http\ or copy example file (fig. 3.15). You can modify the php file as you wish to see images.



```

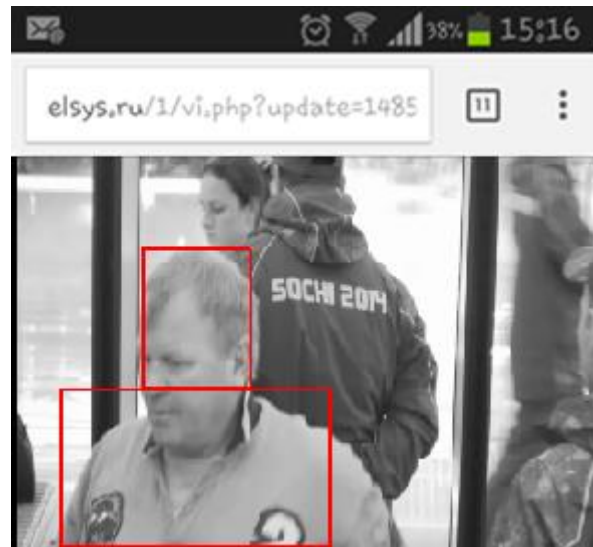
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01//EN">
<html>
<head>
  <title>Vibraimage</title>
  <style type="text/css">
    #vi {
      position: fixed;
      top: 0;
      left: 0;
      min-width: 100%;
      min-height: auto;
    }
  </style>
</head>
<body>
<?php
  $files = array();
  foreach (glob('*.png') as $filename) {
    array_push($files, $filename);
  }
  sort($files);
?>
<a href="?update=?php echo time(); ?>"></a>

</body>
</html>

```

Fig. 3.15. Information panel in S mode. FTP storage.

- 3) Enter to browser on your mobile phone the address of web page. You can see last photo with «suspicious» person (Fig.3.16).



*Fig.3.16 Example of detected person*

**NOTE**, your PC and mobile phone must be connected to Wi-Fi.

## 4. Macro mode. Suspicious behavior detection in flow

**VibraImage** system allows controlling macromovements (macrovibrations) as microvibration. Macromovements analysis uses the same principles as the control of micro-movements, at the same time it allows to monitor the status of the people in the crowd. If micromovements of human head cannot be seen without a technical system, it was well known that movements and psychomotorics reflect emotional state of person since such behavioral reactions are well observed by psychologists and profilers. However, visual inspection of the movements is really subjectivity, at the time, as the vibraimage system macromovements control completely objective and is determined by the calculation formulas and the selected system configuration. The optimal camera location and the choice of checking place are determined with considering the lens parameters, the distance from the camera to the object and the amplitude of motion of the object.

When choosing the location of the TV camera relative to the investigated group of people is need to use the following recommendations:

- The maximum display of human on the frame is preferable, and the camera should not be moved from the investigated group.
- People in the investigated group must be approximately on the same distance from the television camera.
- In the analysis of the emotional state should use an equivalent comparison principle, the correct is a comparison of people making near the same motion, for example, feed the ticket compared with the person submitting the ticket, the person transposing luggage compare with a person committing the same act, etc.

**VibraMID** operates in vibraimage Macro Mode and detects suspicious person with abnormal movement value parameters differs from other persons in crowd. The typical movement value for normal persons in frame shows statistics range for changes in status window for some period.

Vibraimage accumulation period for macromovements registration is smaller than for microvibration registration. It mostly determines by the speed of human body movement and do not suppose movement accumulation and movement repetition.

Typical accumulation period for macromovements covers 1 second and maximum setting N (accumulated frames) depends on camera frequency, for example for 15f/s user stands  $N=15$ , or for 30f/s user stands  $N=30$ .

There is no sense to stand difference between base processing and fast processing frequency for macromovements registration. For micromovement analysis was recommended to stand base processing frequency lower than fast processing because head micromovement is practically invisible for time period less than 0,1 second. However, for macro hand movement or body movement it is not so and when person is active or aggressive it moves very fast, so it is recommended to stand base processing frame rate between (15 – 30) f/s. Also for macromovements analysis is recommended to set frame number  $N(2) = 5$ , because standard 2 frames accumulation gives more red color for any movement (tired operators eyes) and use this window in amplitude or frequency mode. For  $N(10)$  and  $N(15/30)$  used frequency mode.

**Note**, that in order to improve the accuracy of the human state measurement, recommends to control its movement in maximum details, therefore, observe the minimum number of people in the frame. Question of the measurement accuracy for the psychophysiological state should be decided separately for every controlled object. In this case, for more accuracy it is recommended to use personal control in MICRO mode for suspicious people detection in the high important places.

## 4.1 «Macro» mode parameters

Load basic MACRO modes parameters of operation is carried out using a submenu «Settings» - «Defaults». When one of the basic modes of operation (micro, macro or lie detection) select and load its default settings, the system automatically displays only the necessary window mode. To work in the «Macro» are necessary images window, «**Suspect level**» window, which will display the value of danger level, and «**Image capture**» window detected potentially dangerous people photos.

Figures 4.1, 4.2 shows a comparison of the basic settings are set automatically when you select Micro and Macro mode :

- When micromotion control system also monitors the status of the person at the three different accumulation times (from 0,1 to 20 seconds), characterized by the number of frames  $N = 2, 10, 100$ . Recommended accumulation amount frames in macro mode comprise  **$N = 5, 10$  and  $15$**  frames that the input frequency 15 f/s, corresponding 0,3-0,6-1,0 second. Comparison of the number of movements made by a person in a given time, gives a clear picture of the psychoemotional state of a person. If a person is excited or aggressive state, it makes a lot of movement than those who are at rest, and it stands out vibraimage color coloring compared to other people.
- «**Palette threshold**» is set at the control macromovements above ( $L = 150$ ) than in the control micromotion ( $L = 2$ ).
- Frequency of «**base processing**» under the control macromovements set substantially higher than in the control micro-movements, to the 15f/s instead of 5. This is due to the fact that when micromovements no point in increasing the sampling rate, as TV system noise does not allow stable fixing micro-movements with a higher frequency. Another thing macromovements control - movement of the hands, feet or body when walking, turning or other fixed macromovements confident enough television camera, and significantly higher than the noise level.
- In macromovements analysis mode to increase the computing capacity of a PC, the calculations are disabled several parameters and the «**Disable**» information column «S».

VI	M	LD	C	GR	S	DB
[-] <b>Frame rate</b>						
Fast processing					0.0	
Base processing					5.0	
FPS proc. period					2.00	
Downrate					0	
[-] <b>Main</b>						
N(2)					2	
N(10)					10	
N					100	
L					2.00	
Apply global filter					No	
[-] <b>Filters</b>						
Single points					Yes	
Extended					8	
Extended (fast)					8	
Stretch					No	
Max speed contour					No	
Am scale					16	
Space					4	
color image					No	
+ <b>Crop</b>						
+ <b>F6</b>						
FPS filter					No	
E-Monster					No	
Auto downrate					No	
Fixed contour					No	
Stab. X					No	
Stab. Y					No	
+ <b>State levels</b>						
[-] <b>disable *</b>						
disable Am					No	
disable F					No	
disable 2x(fast)					No	
disable VI(10)					No	
disable VI(2)					No	
disable FFT					No	
disable Entropy					No	
disable Audio					Yes	
+ <b>Motion detector</b>						

Fig. 4.1. Default setting for Micro mode

VI	LD	M	C	GR	S	DB
[-] <b>Frame rate</b>						
Fast processing					0.0	
Base processing					15.0	
FPS proc. period					2.00	
Downrate					0	
[-] <b>Main</b>						
N(2)					2	
N(10)					10	
N					15	
L					150.00	
Apply global filter					No	
[-] <b>Filters</b>						
Single points					Yes	
Extended					8	
Extended (fast)					8	
Stretch					No	
Max speed contour					No	
Am scale					16	
Space					4	
color image					Yes	
+ <b>Crop</b>						
+ <b>F6</b>						
FPS filter					No	
E-Monster					No	
Auto downrate					No	
Fixed contour					No	
Stab. X					No	
Stab. Y					No	
+ <b>State levels</b>						
[-] <b>disable *</b>						
disable Am					Yes	
disable F					No	
disable 2x(fast)					Yes	
disable VI(10)					Yes	
disable VI(2)					Yes	
disable FFT					Yes	
disable Entropy					Yes	
disable Audio					Yes	
+ <b>Motion detector</b>						

Fig. 4.2. Default setting for Macro mode

Especially for setting display modes when using the Macro mode in the information column «S» introduced a number of parameters:

- **Macro mode** - If «Macro mode = Yes» than danger level calculation is made on the basis of values of parameters P13, P14, P15 (the description of parameters is see lower). In «Micro» mode danger level calculation is made on the basis of the analysis of values of aggression (P7), stress (P6) and tension parameters.
- **Level L** - sets a palette threshold at danger level calculation. Vibraimage points which brightness less than the specified threshold, are considered «black» and are not used at calculation of a danger level. The vibraimage point is considered active, if its brightness more than the set threshold «Level L». Parameter **P15** defines the relation between the area of «active» vibraimage points to the area of all frame. Parameter **P13** characterizes shift of the histogram to the right in area of high frequencies. So that parameter defines primary color of «active» points of vibraimage.
- **Level S** - defining the area of «active» vibraimage points. If the area of points (in %), which value of brightness is more than value «Level L», is less than value «Level S», than danger level value displayed in status window equally 0. So, if in the frame it is not a lot of «active» points, the level of danger is not calculated. Parameter **P14** defines in % excess of the area of active vibraimage points above the set threshold of «active point» «Level S». So, if the number of «active» points grows, value of this parameter too grows also a level of danger increase.
- **Aura mode** - automatic cut output vibration aura when working in macro mode.
- **Macro mode + -** when mode is switch, the danger level is considered for each individual person in the frame. In off mode - the danger level is averaged over the entire frame. «Macro mode+»= NO recommended when working of face detection algorithms is not effective in this particular case.

#### «Alerts» section:

- **«Critical level»** – Sets a threshold of «danger level» at which excess the person is considered «dangerous».
- **«Auto capture image (s)»** – If set «non zero» value, than the image of «dangerous» object at his detection will be automatically save in an external file. The chosen value of the given parameter determines in seconds the period of saving the pictures in a file. Simultaneously the image «dangerous» will be displayed in **«Image capture»** windows.
- **«Show N image»** – If set value N distinct from 0 in **«Image capture»** window will be displayed at once N images of the «dangerous » people which have been found out for the specified interval **«Auto capture image (s)»**. If set value N = 1 - that for the specified interval in **«Image capture»** will be displayed only one image, and we can pass other «dangerous» person!
- **«Auto capture image (s)»** – Value of this parameter (other than 0) specifies the number of seconds between saving images to a file and display them in «Image capture» window.
- **«Area threshold %»** and **«Area level %»** – These settings is recommended only for experienced program users. Area and significance (level) coefficient factor are given in % and is introduced to take into account the factor of small area of moving objects relative to the area of the whole frame when calculating the danger level.

## 4.2 Face detection mode

Switch on «**Face detection**» mode is made in the same section of the «S» information panel (fig.4.3). If «**Face detection**» =Yes – face detection mode is used. No – without face detection.

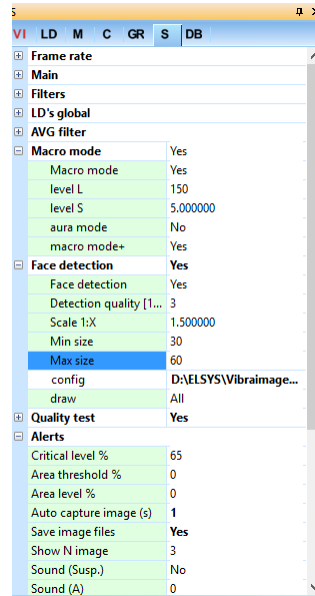


Fig.4.3. Face detection mode settings.

The parameter «**Detection quality**» defines quality of persons face capture. 1 – capture only one large person in the frame (loading of the processor is minimal), 4 – search of all face (even small) persons in the frame (loading of the processor is maximal).

Parameter «**Scale 1:X**» sets picture compression ratio before process of search of persons. By default, value 2.0, i.e. video of a format 640x480 will be transformed by the program to a format 320x240. Compression of a format is necessary for reduction of loading of the central processor in case of simultaneous increase in speed of the main processing (base processing). In case of value 0 compression isn't made. The lower the compression, the more CPU usage. The greater the compression, the lower face recognition algorithm works.

Parameters «**Mines size**» and «**Max size**» set the sizes of rectangular (in pixels) for persons face searching. The given parameter is necessary for set depending on concrete medium-sized people on the computer screen.

The parameter «**Config**» is intended for loading new algorithms of persons search. At installation of Vibraimage program on your computer will be created the subdirectory «...\VibraImage10\Ocv\» in which files of various algorithms of persons search settle down. For loading new algorithm, it is necessary to execute the following actions:

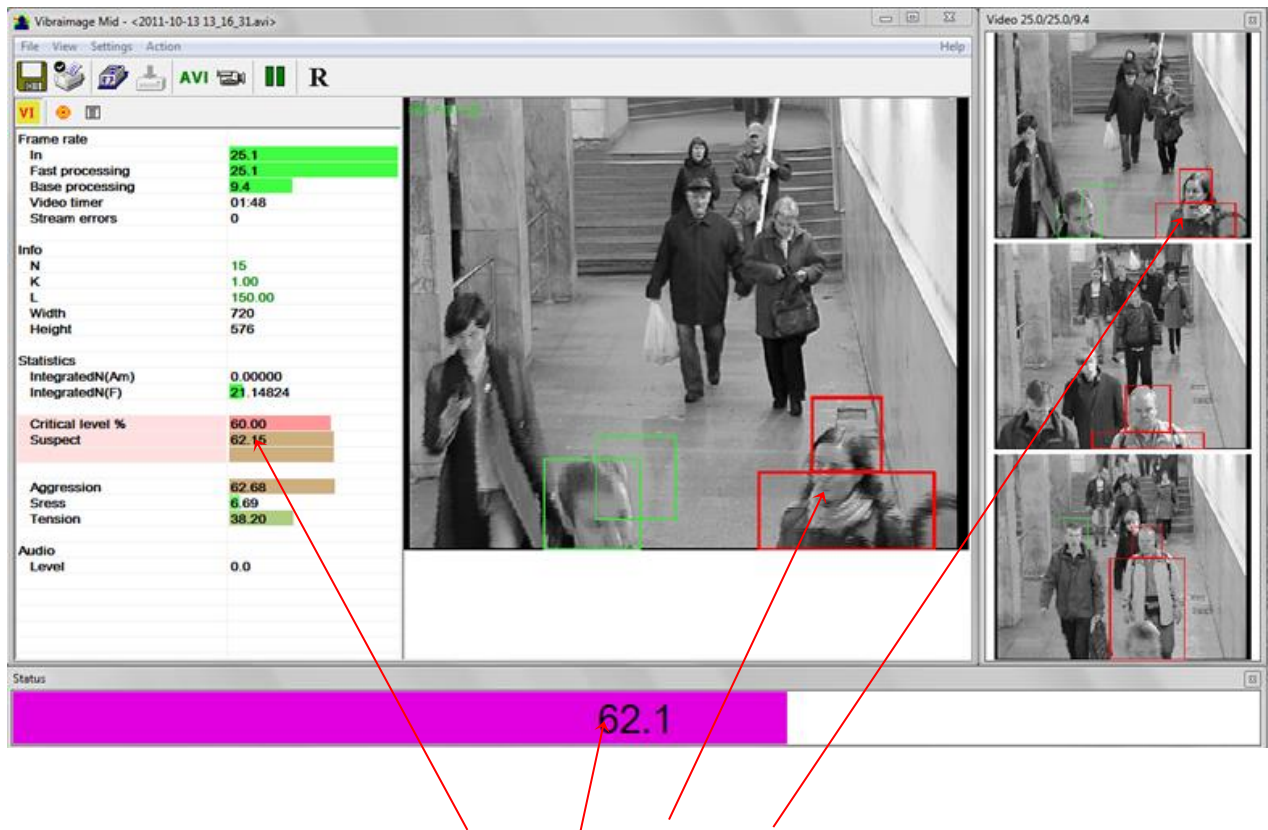
1. In «**File**» menu select item «**Open**». Then open folder \VibraImage10\Ocv\ and choose new algorithm for calculation.
2. In line «**Config**» appear path to selected file.



**Note**, that each algorithm at work require different amounts of computer resources and implementing different quality capture individuals. When choosing the algorithm is recommended not to exceed the CPU utilization of more than 70 %. By default, when you install the system VibraImage very little resource-loaded algorithm ocv\_face.xml. For fast computers recommended load frontalface\_default.xml algorithm. But, **note**, the choice of the algorithm and the quality of the capture of persons recommended when setting up the system after it is installed in a particular location.

If parameter «**Draw**» = No – not draw rectangle around face. If «**Draw**» = Yes – draw rectangle around «more danger» single person, «**Draw**» = All – draw rectangle for all person in frame:.

- For non-danger person rectangle draw green color, but if person suspect level more than «**Critical level**», then rectangle draw red color (see fig. 4.4).
- If a potentially «dangerous» man except the red outline appears around the head and a red outline around the body, this person requires more attention from the security services, because the system repeatedly fix it increased the suspect level.



*Fig 4.4. Attention, «Critical level» is exceeded.*

**Note**, each algorithm by operation requires different quantity of the computer resources and realizes different quality of capturing of persons. It isn't recommended to exceed loading of the central processor more than 70%. By default, in case of installation of **VibraMID** the most a little

resource-intensive algorithm of ocv\_face.xml boots. For productive computers it is recommended to load algorithm of frontalface\_default.xml. But, pay attention, the choice of algorithm and quality of taking of persons is recommended to be made in case of setup of system after its installation in a specific place.

For convenience of the operator in section «**Alerts**» of the «S» information panel (fig. 4.4) the following additional parameters are entered:

1. «**Critical level**» – sets a threshold of «danger level» at which excess the person is considered «dangerous»
2. «**Auto capture image (s)**» – If set «non zero» value, than the image of «dangerous» object at his detection will be automatically save in an external file. The chosen value of the given parameter determines in seconds the period of saving the pictures in a file. Simultaneously the image «dangerous» will be displayed in «**Video windows**».
3. «**Show N image**» – If set value N distinct from 0 in «**Video windows**» will be displayed at once N images of the «dangerous» people which have been found out for the specified interval «**Auto capture image (s)**». If set value N=1 – that for the specified interval in «**Video windows**» will be displayed only one image, and we can pass other «dangerous» person! **Note attention**, at work in the given mode «**Video windows**» should be preliminary open!

**Note**, when operating in this mode, the window «**Video windows**» should be previously opened!

## 4.2. First start and settings determination

1. Control status level window during the statistics period
2. Based on the aims of Vibraimage Macro Mode change or leave default settings for «levels L» and «levels S» in macro mode settings.

Standard aim of vibraimage macro mode control is to indicate situation with movement value in frame more than threshold. For example, we control entrance of 100 persons through controlled place. 50 persons has status level (during macro mode control) less than 50%, 80 persons have status level less than 55%, 90 person has status level less than 60%, and only 10 persons have status level more than 60%. That means if we want to indicate 10% of crowd differs from middle, in this case default settings with alarm threshold 60% are ok.

But if we have that 100 entering persons have status level less than 30%, that means we need to change alarm threshold, or better, levels L and S in macro mode settings from default. Standing less L and S levels we increase the sensitivity of Suspected status indication, so we could change default settings for  $L = 1$  and  $S = 1$ .

3. Control status level window with changed settings during the statistic period.

With new settings we will see the other % of Status for the same recorded or live video. Supposed that for  $L = 1$  and  $S = 1$  settings we will see that 100 persons have status level less

than 55%. That means we need to change again settings for achievement alarm threshold 60%.

4. Based on the aims of Vibraimage Macro Mode change or leave next settings for levels L and S in macro mode settings.

So we change settings to  $L = 1$  and  $S = 0,1$ .

5. Do the same steps till status level statistics will satisfy aims of Vibraimage Macro Mode.

For this settings  $L = 1$  and  $S = 0,1$  we have 90 persons status less than 60%, and for 10 persons more than 60%. We could fixed this settings if we have aim to indicate 10% of people with movement amount more than stand threshold.

6. Stand requested «non zero» level for Auto capture image (s) in Alerts settings based on Vibraimage Macro Mode aims for storage images of suspected persons on the hard disc. Stand other Alerts settings according to control aims.
7. Now control status level window on the screen. For work **it is recommended** to use a «**Source video**» viewing mode then if suspect level of person excess «**Critical level**» and value of «**Auto capture image**» parameter not equal 0 in an external file in the specified catalogue the image will be saved, allowing to identify the person.

Control more colored person by the other means if status level is more than stand threshold and program gives alarm signal.

**Attention!!!** if you are changing system settings when working in the «Macro» mode, then you need to constantly monitor the following settings:

1. After start of Vibraimage program and person vibraimage displaying on the screen loading of the computer central processor power must be less than 60 %.
2. Speed of input frame processing. Speed of «fast processing» should be not less than 25 frame per second at resolution not less 640x480 pixels. Speed of «base processing» should be not less than 14-15 f/s.

If you change the «macro» mode settings and specified speed is not respected, it is necessary to set other parameters that require less computer resources.

**Note**, when a detailed system configuration at a particular place of its installation may require advanced settings «Area threshold», «Area level», «Level S» and « Stab. X, Y ».

## 5. Warranty

Maintenance service and service regulations of **VibraMID** system is carried out according to this Manual and instructions of used hardware maintenance (a computer, the camera, etc.).

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Updates and questions on [www.elsys.ru](http://www.elsys.ru)

Russia, 194223, Saint-Petersburg, Toreza, 68.

ph./fax: +7 (812) 552 67 19

e-mail: [minkin@elsys.ru](mailto:minkin@elsys.ru)

[www.elsys.ru](http://www.elsys.ru)

[www.psymaker.com](http://www.psymaker.com)