Operator Functional State Assessment System

VibraStaff

MANUAL

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CONTENT

1. Introduction

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. VibraStaff system detects human emotions by the control of three dimensional (3D) head-neck movements and fluctuations, accumulated as frame difference in several video frames.

Micro mode measures micromovements, time and spatial fluctuations of object, by calculation of vibration parameters (frequency and amplitude) for each element (pixel) of the researched image. With the help of this method it was possible to define, that VibraImage parameters indicates (measures or quantitatively characterize) emotions or personality traits and psychophysiological status of a person.

The human operator is a crucial component of complex modern systems. The complexity of these systems, the rapid tempo of contemporary civil/military operations and reduced staffing all contribute to the high cognitive demands experienced by civil/military personnel. Unfortunately, these systems do not account for the functional state of the human operator. The rate of information flow, the number of decisions, and actions that must be carried out can become so demanding that the cognitive capacity of the operator can be exceeded. This can result in disastrous consequences. These catastrophic events are brought about by human error when operators are placed in situations requiring cognitive resources beyond those currently available. Other system components are routinely monitored for their state of health. If deficiencies are found, then corrective actions are taken or the mission is aborted. Similar monitoring and corrections are needed for the human component.

1.1. Basic applications

VibraStaff is designed for psychophysiological diagnostics and psychological researches of human operators before the shift. VibraStaff solves the following tasks:

- operator functional state assessment before a shift and stopping access to the shift for persons with the risk of human factor;
- functional and psychophysiological personal diagnostics based on corresponding individual and statistic norms;
- operator functional and psychophysiological states monitoring and statistics processing for operators of complex modern systems, like airport supervisor, traffic controller, nuclear station operator, drivers, etc.

1.2. 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 $0,1 \div 10$

1.2.2. Digital (web) camera requirements

- Sensor   CCD or CMOS Sensor
- Resolution, pixel., more than   640 x 480
- USB 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 higher
- RAM   more than 4 Gb
- HDD   more than 10 Gb free space
- USB port   1 free USB ports version USB 2.0
- Installed software   Microsoft Office Excel 2010 (**64 bit only**) or later
- Video capture   WDM-compatible video device

1.3. Package delivery contents

1.	VibraStaff software	-	1
2.	Activation code	-	1
3.	User's manual	-	1
4.	Digital USB camera (option)	-	1
5.	Personal computer (option)	-	1

2. VibraStaff software installation

To install VibraStaff please follow steps below:

1. Go to Web page http://www.psymaker.com/support/downloads/
2. Load file VibraStaff http://www.psymaker.com/downloads/VibraStaff10.exe
3. Run file VibraStaff.exe from archive file
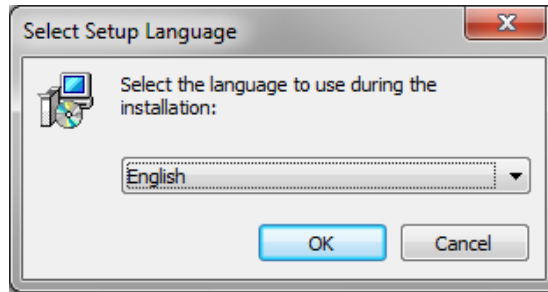4. Select language for installation procedure (fig. 2.1).

Fig. 2.1. Choice of language installation

5. Press button «Next» in the appeared window of the beginning installation.
6. Accept the license agreement and to press button «Next» in the appeared window.
7. In the appeared window specify a way to the catalogue where files of the program will be written down, then to press button «Next».
8. Press button «Next» in the appeared window, allows installation of software files on your computer.
9. In the appeared window select versions of the program which you want to install on the computer (fig. 2.2).
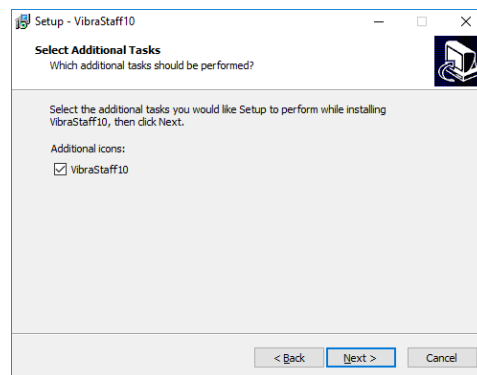

Fig. 2.2. Choice of additional tasks during installation

10. Press button «Install» at the start of installation.
11. Press button «Finish» at the end of installation.
12. VibraStaff program pictogram appears after the end of installation in system menu and on desktop of your computer.
13. To reboot a computer.

2.1. VibraStaff software activation

Attention:

1. Procedure of activation is made once at the first start of the program.
2. Before the program activation it is necessary to buy this modification of the program in the online shop Psymaker http://www.psymaker.com/ru/shop/
3. Activation procedure requests access to the Internet for receiving answer code from server.
4. Activation code has the structure given in the table.

Key type	Software modification
VI10_xxxxxx_ STF	VibraStaff software is intended for: • operator functional state assessment before a shift and stopping access to the shift for persons with the risk of human factor; • functional and psychophysiological personal diagnostics based on corresponding individual and statistic norms; • operator functional and psychophysiological states monitoring and statistics processing for operators of complex modern systems, like airport supervisor, traffic controller, nuclear station operator, drivers, etc.

2.1.1. Standard activation

1. To start activation is necessary to get starts the program VibraStaff.
2. At the first start of the program the activation window will be displayed (fig. 2.3).

Fig. 2.3. 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. 2.4).
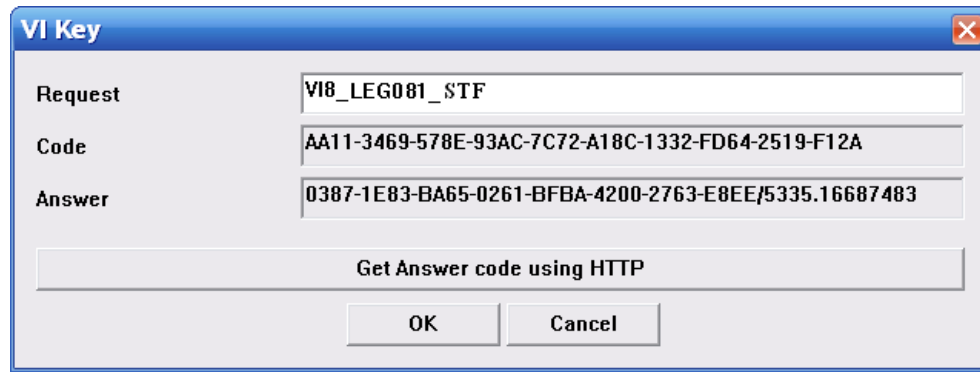
Fig. 2.4. Successful activation

5. Press button «**OK**». VibraStaff will be automatically started. **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 VibraStaff.
2. At the first start of the program the activation window will be displayed (fig. 2.5).

Fig. 2.5. DEMO activation window

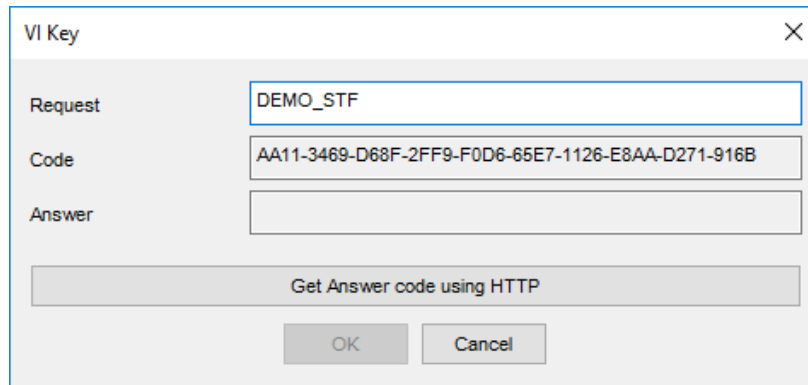3. In the field «**Request**» it is necessary to enter uppercase letters of «**DEMO_STF**» (fig. 2.5). After input of an demo activation code to press the button «**Get Answer code using HTTP**».
4. The activation code will be checked up through the Internet and, in case of successful end of activation procedure, the answer code will be sent and will be appeared in the field «**Answer**» (fig. 2.6).
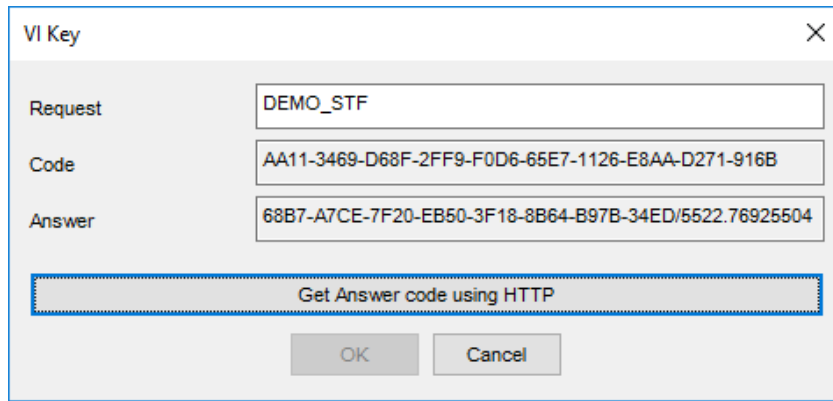
Fig. 2.6. Successful DEMO activation

5. Further items 5-8 as in case «**Standard activation**»

2.2. Reinstallation of VibraStaff

Note, the ability to reinstall VibraStaff software on a new computer is given to user. For this purpose it is necessary to execute the following actions:
1. Connect computer to the Internet.
2. Start VibraStaff program for reinstallation on a new computer.
3. In the menu «Help» choose item «**About VibraStaff…**» (fig. 2.7).
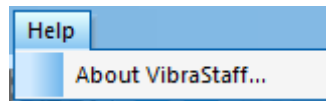
Fig. 2.7. Menu «Help»

4. In the opened window press the button «**Unregister key**» (fig. 2.8).
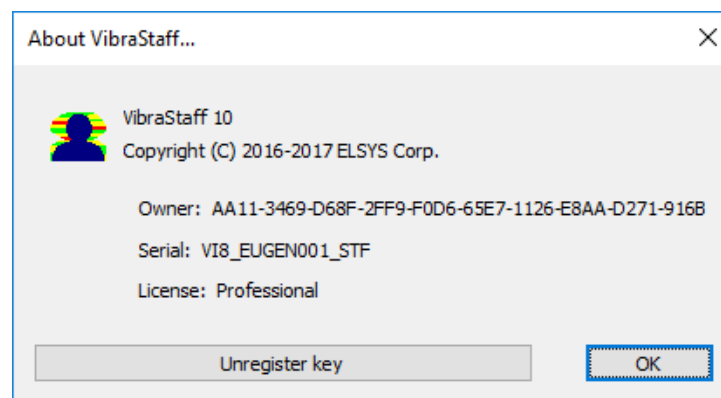
Fig. 2.8. Information about the program

5. Close the program.
6. Connect a new computer to Internet.

7. On the new computer install the program and 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 VibraImage system

1. After the first start of the program you will see the program window shown in fig. 2.9.
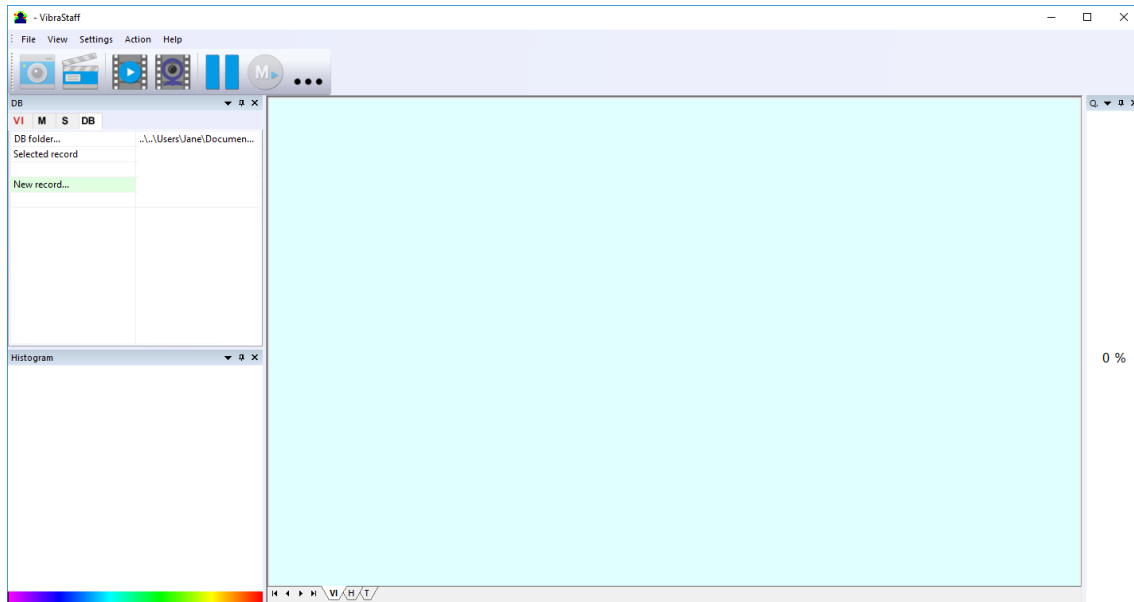
Fig. 2.9. First program start

2. In menu «**Settings**» => «**Language**» select interface language (fig. 2.10).

Fig. 2.10. Select language

3. Once connected to the computer camera in the menu **"Settings" = > "Video »** (fig 2.11) you need to select the camera to work (in fig 2.11 -. Microsoft Lifecam Cinema camera).
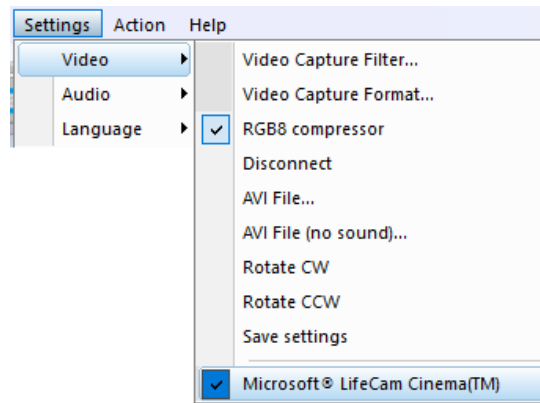
Fig. 2.11. Video camera connecting

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 (see. ch. 2.5) and, if it necessary, eliminate the causes of low-quality video.
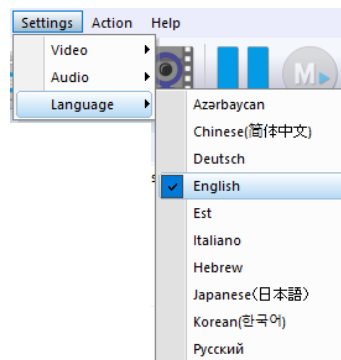7. Select the directories for recording video information and log files (see. ch. 3.4.4).
8. Get started in accordance with the program description.

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).   Parameter setting procedure is described in the CamIp manual 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. 2.12). 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.
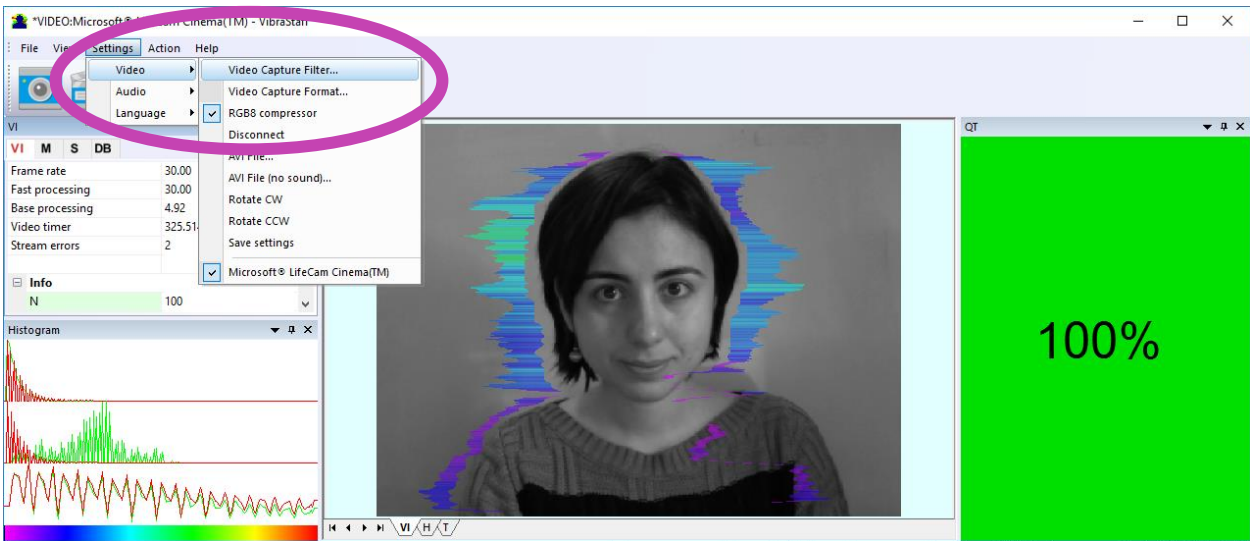
Fig. 2.12. Opening of the camera's settings menu («Video capture filter...»)

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 2.13 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.
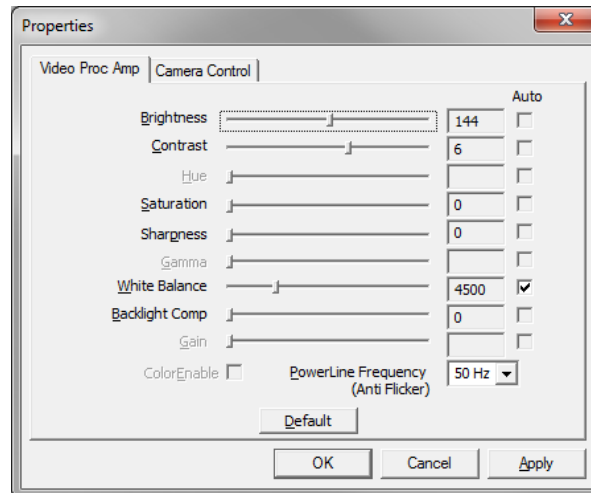
Fig. 2.13. Video setting, camera « Microsoft LifeCam Cinema»

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.So 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. 2.14). 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. 2.15).
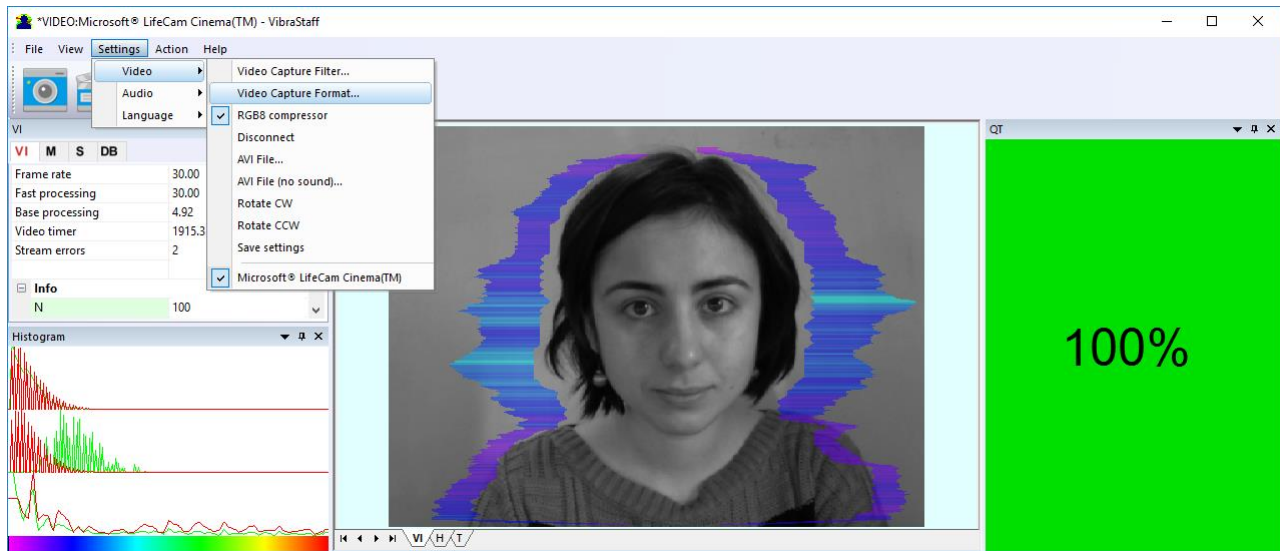
Fig. 2.14. Opening the settings window «Video capture format»
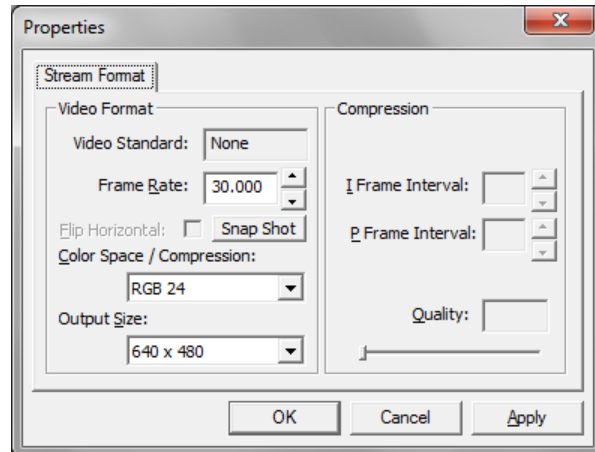
Fig. 2.15. Window «Video capture format»

Note, when changing camera settings in the program VibraStaff 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.

2.3.4 Checking the settings on the test table

During the first start of Vibraimage system and periodically it is recommended to test image quality by the test table. It is required to place a test pattern opposite to the camera so that the image of the table occupies the entire space of the frame. To achieve the optimal contrast range of object is need to stand in camera settings auto regulation of illumination in case of unstable illumination (fig. 2.16) and manual regulation of illumination in case of a constant illumination (fig. 2.17).
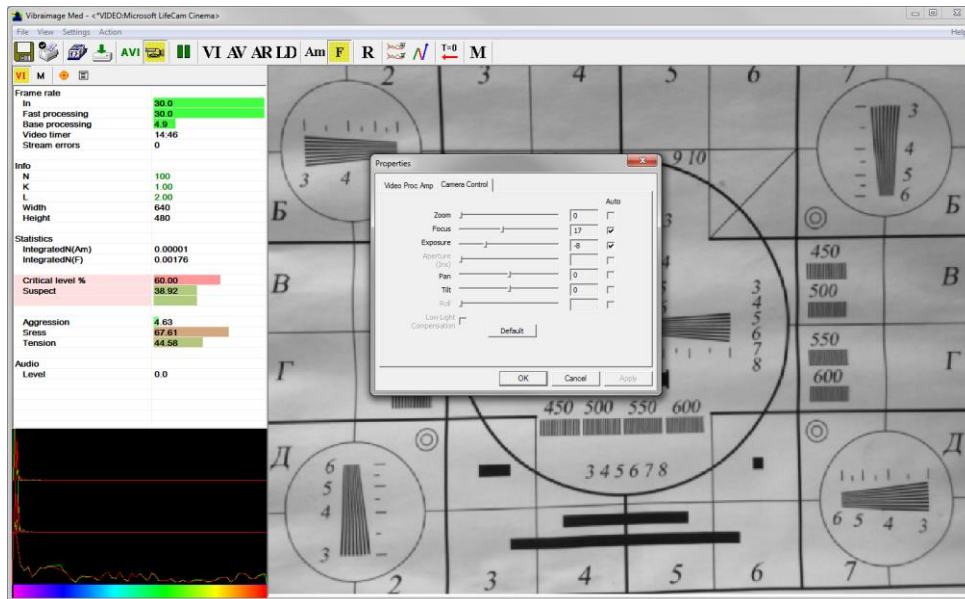
Fig. 2.16. Checking the camera settings on the test table, automatic regulation of the exposure (mode is recommended for unstable object illumination).
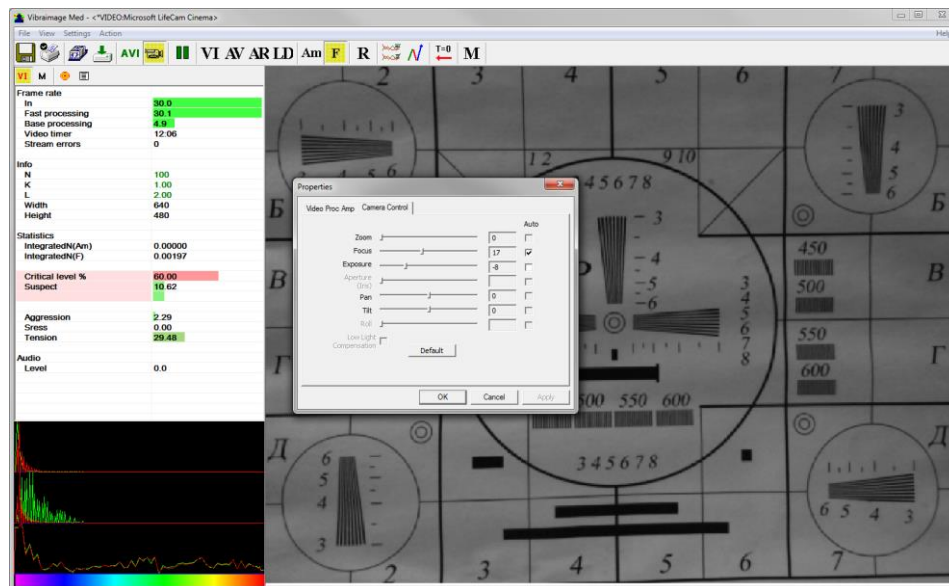
Fig. 2.17. Checking the camera settings on the test table, manual regulation of the exposure (mode is recommended for stable object illumination).

2.3.5 Video quality auto checking function

The VibraStaff program has   quality control function image quality control during the test. Since the calculation of human reaction using the video image, the quality control for the processed video is necessary to obtain a correct test result. Error message and the low quality of video will appear on top of the **QT** windows (Fig. 2.4), but only if the **"Quality test"** mode in "S" information panel is switch on.

Program gives error indication if the image quality is lower than standard vibraimage requests:

Error 1 – indicates when facial image is lower than necessary. For cancel this error is need to move checked person near to camera or start zoom function on camera.

Error 2 – indicates when camera noise level is higher than necessary. The reason of this error could be low illumination, incorrect camera settings or camera vibration.

Error 3 – indicates when computer input frame rate is lower than necessary. Requested norm for processed frame rate is more than 24 f/s. This errors indication was done for deleting unqualified staff influence during results control.
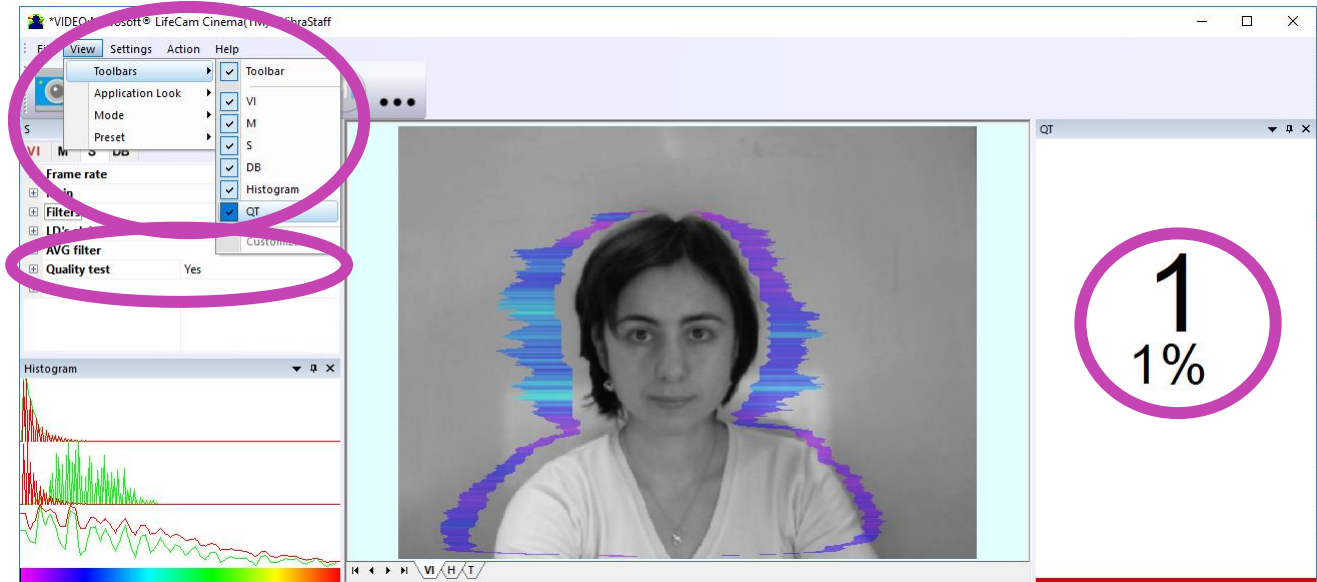
Fig. 2.21. Quality test indication stands Yes in settings and Error 1 shows in the image window. Head image size is lower than requested.

Program gives error indication if the image quality is lower than standard vibraimage requests:

Error 1 – indicates when facial image is lower than necessary. For cancel this error is need to move checked person near to camera or start zoom function on camera.

Error 2 – indicates when camera noise level is higher than necessary. The reason of this error could be low illumination, incorrect camera settings or camera vibration.

Error 3 – indicates when computer input frequency rate is lower than necessary. Requested norm for processed frame frequency is more than 24 f/s. This errors indication was done for deleting unqualified staff influence during results control.

The size of the person's head image in the picture elements (pixels), which determines the accuracy of recorded vibrations, requires constant monitoring during testing. When tested with a video image analysis there are no severe restrictions on the movement of the test person, as required by the contact method. This person feels natural, which increases the accuracy of test results.

However, the natural behavior can lead to the fact that during the test response deviates from the camera and the size of the human head image becomes less than required. To resolve this issue vibraimage system constantly monitors a person's head size of the image and displays an error message (1) in the window «**QT**» in the case of reducing the size below the limit. In addition, vibraimage program includes a permanent face detection algorithm, which ensures elimination of errors from a lack of a real image of the person in the frame during testing.

Temporary noise signal from the video camera includes a video camera noise and illumination instability and can significantly affect the test results. In this case, at the slightest noise level exceeds the specified threshold, the system automatically displays an error message (2) in «**QT**» window (see. Fig. 2.5).

Despite the fact that the television camera may transmit to 30 f/s with the set resolution, it does not guarantee that the computer receives and processes the incoming video data in real time. And any deviation from the information processing in real time resulting in a loss of information and hence reduce the reliability of the test. By reducing the actual input frames frequencies and processing frequencies below the set limit, the system automatically displays a warning error (3).

Window «**Quality Test**» (**QT**) indicates the time in %, for which the image quality of 100 %. When the quality test indicates 43 % means that only 43 % of the testing time have no errors, and the 57 % of test time the image quality contained 1, 2 or 3 errors.

Note, before the start of the test should ensure that the program processed the image of a human without errors.

3 VibraStaff. User's manual

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

VibraStaff is intended for studying of psycho-physiological and psycho-emotional characteristics of living biological objects and also can be applied to the lifeless objects making periodic vibrational motions. The main application is medical diagnostics.

After start of VibraStaff 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 VibraStaff module;

- name of the current database record to which there is an operation.
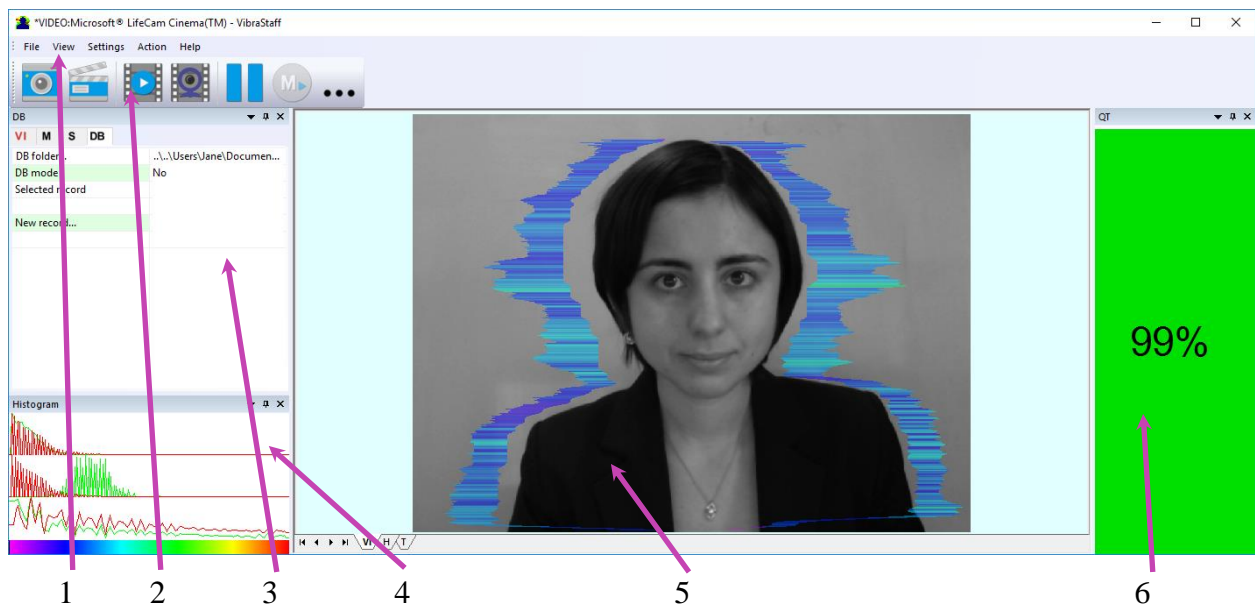
Fig. 3.1. Main window VibraStaff

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.).
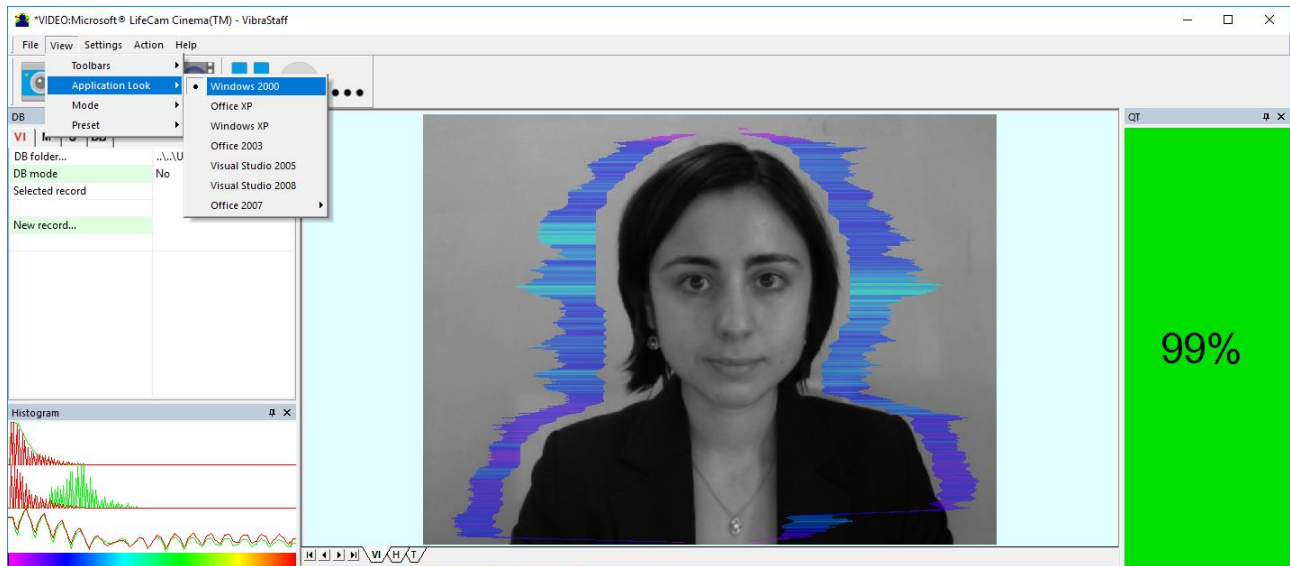
Fig. 3.2. Style «Windows 2000»

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 6 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, M, S, DB – information panel windows;

4. Histogram – window for vibraimages parameters histogram in real time mode;

5. Images window for displaying vibraimages (VI), result's histograms (H), information-energy graph (T);

6. QT – image quality window.

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.
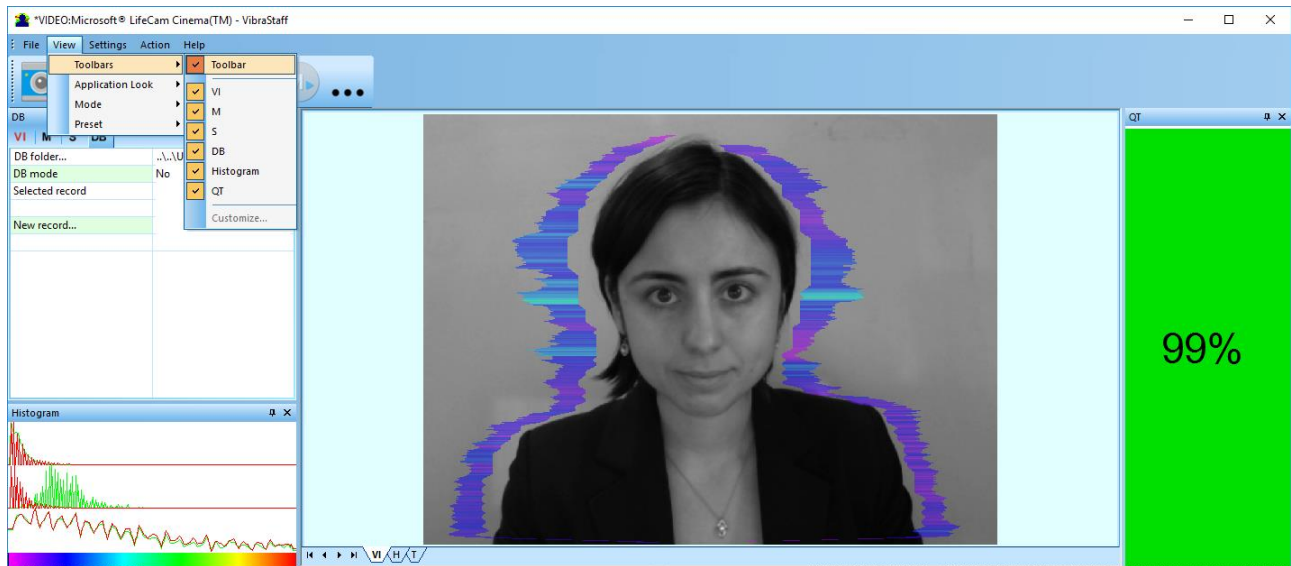
Fig. 3.3. Submenu «Toolbars»

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.
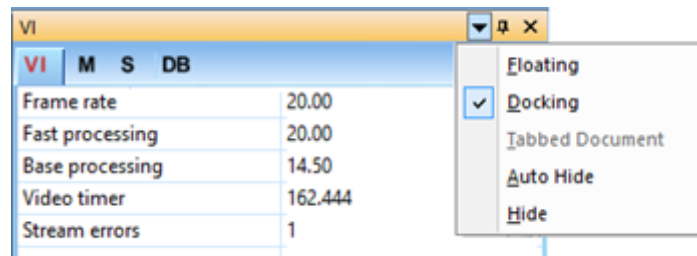
Fig. 3.4. Window control element

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 3.11 additional windows hided and moved to the border of the main window and they icons are highlighted in orange color.
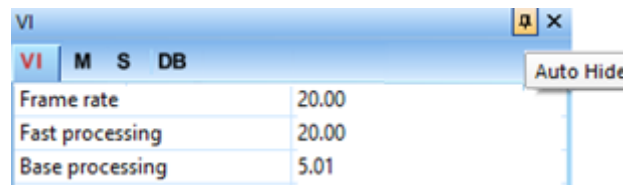
Fig. 3.6. Control element «hide window»
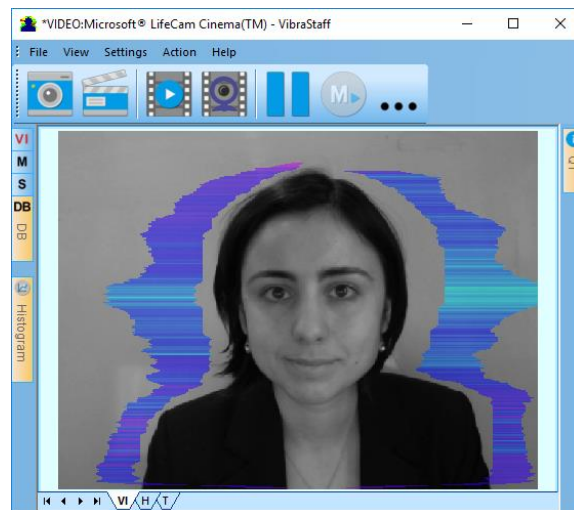
Fig. 3.7. All additional windows are hide.

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:
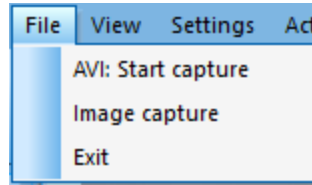
Fig. 3.8. Menu «File»

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:
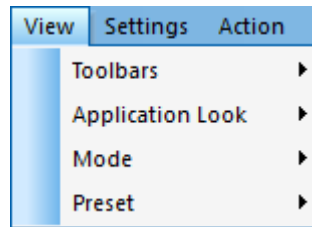
Fig. 3.9. Menu «View»

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 **«Presets»** 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 **«AV»** mode [«Aura - Vibraimage mode»] the contour of the object allocated around the vibraimage. Vibra-aura line size depends on medium line vibration amplitude. Vibra-aura line color depends on maximum line vibration frequency inside vibraimage contour (fig. 3.10b).

- In **«AR»** mode [«Aura on the Real image»] the vibra-aura of the person is shown around his real image (fig. 3.10c).

- In **«LD»** mode [«Lie Detector mode»] image area shows real object image(fig. 3.10d).
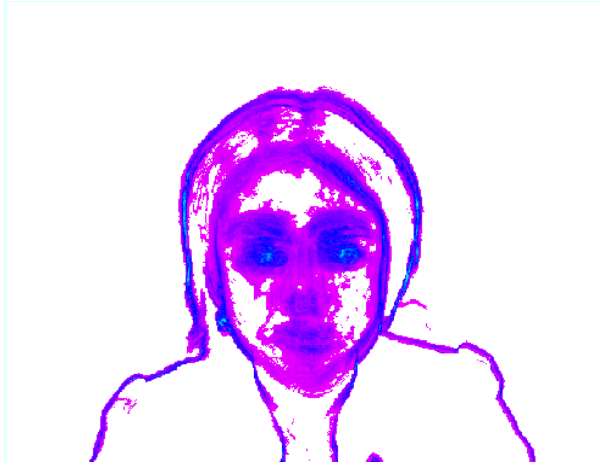
3.10a Режим VI
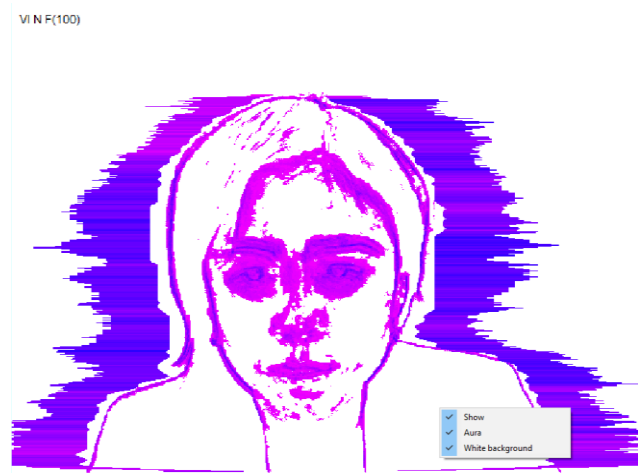
3.10b Режим AV

3.10c Режим AR

3.10d Режим LD

3.10 Image area in different modes

3.2.2.1 Submenu «Mode»

Item **«Mode»** (fig. 3.11) selects additional settings of information in image area.
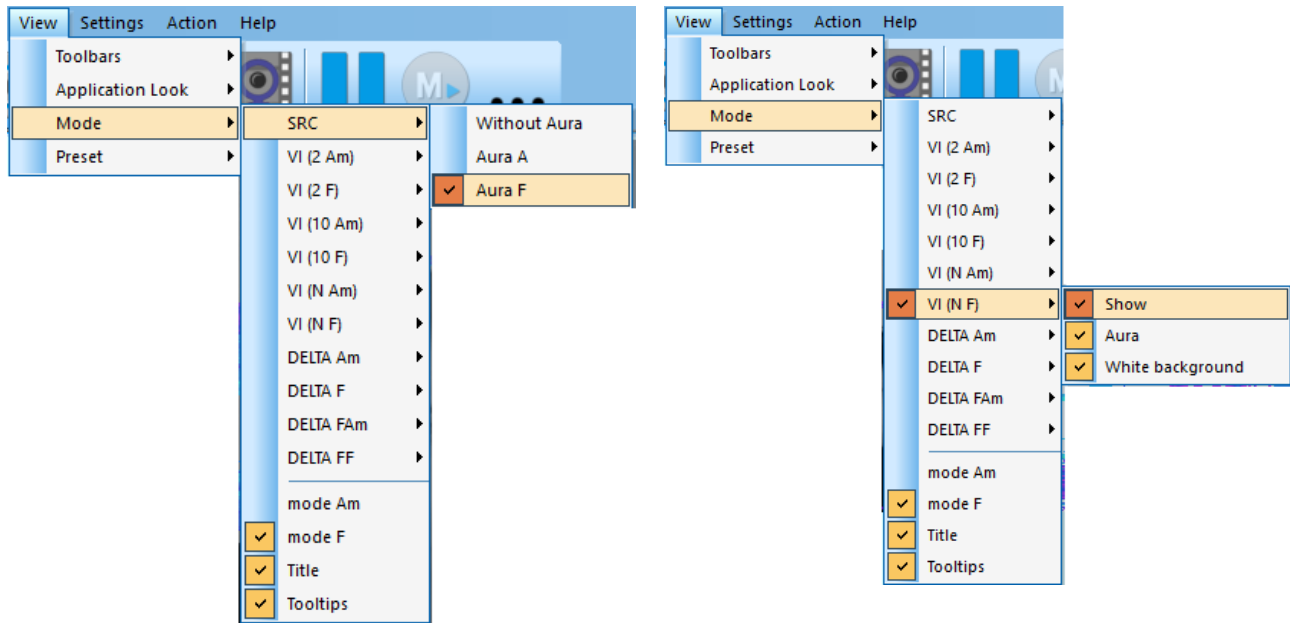
Fig. 3.11. Submenu «Mode»

Note, in different modes VI and AV you have the additional possibility to change color of a background image and to add aura to vibraimage. The same result is possible to receive if to bring the mouse pointer to a window of the chosen image and to press the right button of a mouse (fig. 3.12b).

- In **«SRC»** mode shows source video from camera without processing (fig. 3.30). It is additional possibility to display the aura on the real image of person
  constructed on the analysis of pixels vibration amplitude or frequency or pixels vibration frequencies. The length of the beam vibra-aura in this case will be determined by the average value of the points parameter in a row, and the color of the beam vibra-aura – by the maximum value.
- In **«VI (2 Am)»** and **«VI (2 F)»** modes display vibraimage, processed during 2 frames and constructed on the basis of amplitude **Am** and frequency **F** analysis of vibration. It is additional possibility to change color of background image and to add vibra-aura to vibraimage.
- In **«VI (10 Am** and **«VI (10 F)»** modes display vibraimage, processed during 10 frames and constructed on the basis of amplitude **Am** and frequency **F** vibration analysis.
- In **«VI (N Am)»** and **«VI (N F)»** modes display vibraimage, processed during N frames and constructed on the basis of amplitude Am and frequency F vibration analysis. The number of frames, corresponding to parameter N, is set in «VI» information panel. It is additional possibility to change color of background image and to add aura to vibraimage.
- In **«Delta Am»** and **«Delta F»** display frame difference on the basis of amplitude Am and frequency F vibration analysis in base processing mode without filter preprocessing. It is additional possibility to change color of background image.

   Note. In this mode the vibra-aura will be based on the vibraimage which has been accumulated for N frames!

- In **«View mode Delta FA»** and **«View mode Delta FA»** modes display frame difference on the basis of amplitude Am and frequency F vibration analysis in fast processing mode without filter preprocessing. It is additional possibility to change color of background image.
- In **«mode Am»** visualization and calculation of object parameters processed by pixel vibration amplitude.
- In **«mode F»** visualization and calculation of object parameters processed by pixel vibration frequency.
- Item **«Title»** [Title] switch on displaying a name of mode or AVI file in the upper left corner of each image window.
- Item **«Tooltips»** – enable/disable output tips.
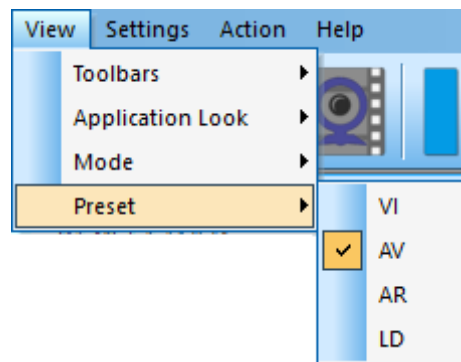
Fig. 3.12. Submenu «Preset»

3.2.3. Menu «Settings»

Menu «**Settings**» (fig. 3.13) allows choosing language, locking system, choosing camera settings and contains the following items:
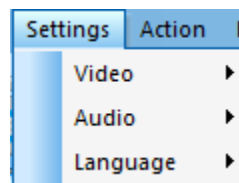
Fig. 3.13. Menu «Settings»

3.2.3.1 Submenu «Video»

Submenu **«Video»** contains options of video modes. Its can differ depending 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.
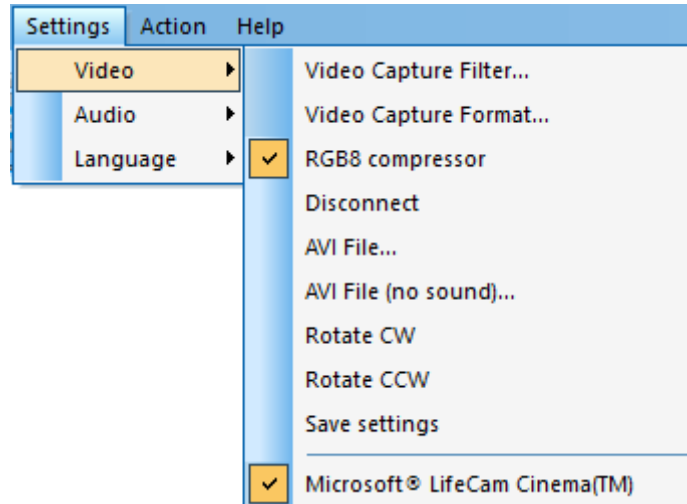
Fig. 3.14. Submenu «Video»

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 VibraStaff.

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.

3.2.4. Menu «Action»

Menu «**Settings**» (fig. 3.15) contains the following items:

Fig. 3.15. 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.

Item **«Reset timer»** - reset to «0» video file timer. The conclusion video begins all over again.

At a choice of item **«Measurement»** (or corresponding toolbar button) the system makes accumulation, averaging and a display of parameters for the specified time period. The results display is made in the information panel in a mode «M». In the same place in seconds value of the averaging period **«Duration»** is set.

3.3 Toolbar

Toolbar of VibraStaff shown on the fig. 3.16.

Fig. 3.16. Toolbar of VibraStaff.

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

 – printing current image;

 – AVI file - start record;

 – loading AVI file;

 – connection of operating video source, for example, webcams;

 – pause;

M – switching on/off mode of accumulation and averaging of parameters for the certain period;

... – open archive folder with results files.

3.4. Information column

Indication of information column (fig. 3.17) depends on using mode:

VI M S DB

Fig. 3.17. 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 «M» the average values of vibraimage parameters which have been calculated and are average for the certain period are displayed;

- In the mode «S» settings of basic parameters for vibraimage processing are configured;

- In the mode «DB» input and selection of the demographic information and a folder for archive storage is configured.

Note, values of parameters in fields which are allocated by a green font, can be changed by the user (fig. 3.19, parameters N, 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.

In the bottom part of information panel displays three windows with results of the frequency analysis (fig. 3.18). In the first window the frequency analysis vibraimage on the whole frame (by red color - amplitude, green color - frequency of vibration pixels) is displayed. In the second window the frequency and amplitude histograms for external vibraimage (aura), and in the third - spectrums of the frequency analysis with application of FFT of two parameters (A1X and F1X) are displayed.
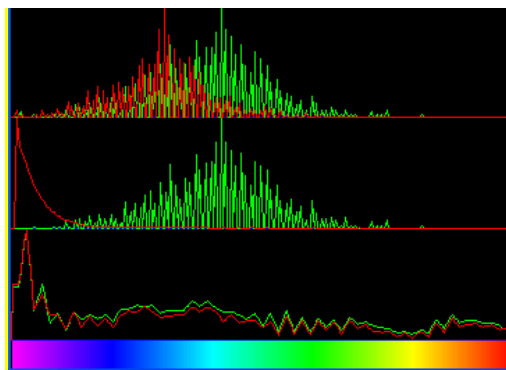
Fig. 3.18. Histograms windows

3.4.1. Information column. VI mode

In the mode «**VI**» information panel (fig. 3.19) 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. 3.19. 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.

3.4.2. Information column. M mode

In a mode «**M**» an information column (fig. 3.20) allows to control average for the period parameters value of psycho-emotional person conditions and their deviation from the established norm. The basic applicability of the given mode is use of vibraimage system for medical diagnostics and psychological researches.

M		⊟ ✕
⊟ **Config**		
Progress	0%	
Duration (s)	60	
⊟ **T10**		
⊟ **Aggression (P7)**	25.0 0.0	
V	25.0	
S	0.0	
Vi	0.0	
N Min	20.0	
cMin	0.0	
N Max	50.0	
cMax	0.0	
⊞ **Stress (P6)**	17.3 0.0	
⊞ **Tension/Anxiety (F...**	13.9 0.0	
⊞ **Suspect (P19)**	19.0 0.0	
⊞ **Balance (P16)**	70.4 0.0	
⊞ **Charm (P17)**	85.3 0.0	
⊞ **Energy (P8)**	19.6 0.0	
⊞ **Self regulation (P1...**	77.9 0.0	
⊞ **Inhibition (F6)**	23.5 0.0	
⊞ **Neuroticism (F9)**	13.2 0.0	
⊟ **P**		
P1	45.750839	
P3	16.436762	
P4	1.366881	
Health (P21)	0.000000	
Health' (P22)	0.000000	
ΣVi (P23)	0.000000	
Extraversion (P26)	0.000000	
Stability (P27)	0.000000	
⊞ **A**		
⊞ **F**		
⊞ **S**		

Fig. 3.20. Information column in the M mode

Value of the averaging period is set in seconds in a field **«Duration»**. Start of the beginning of information accumulation is made by a choice of item [«Measurement»] the menu [«Action»] or pressing of the toolbar button   . After start of a accumulation and averaging mode in the top of an information column there is a running line [«Progress»], displaying a course of data accumulation process.

Information column in the «**M**» mode shown following information:

- Speed of input frame from the camera [«FPS_in»], speed of frame processing for a base processing mode [«FPS_BP»] and speed of frame processing for a fast processing mode [«FPS_FP»];

- Current values of based processed VibraImage parameters A1-A4, F1-F9, S1-S7, P1-P4.

  The group of parameters **A1-A4** registers amplitude of vibrations:

  A1 –   Frame difference between two consecutive frames

  A2 –   Frame difference accumulated in 10 consecutive frames

  A3 –   Frame difference accumulated in N consecutive frames

  A4 –   Value of parameter A1 filtered on 10 frames

  The group of parameters **F1-F9** registers frequency of vibrations (amount of changing points):

  F1 –   Calculated value of changed signal pixels amount in 2 consecutive frames

  F2 –   Averaged value of changed signal pixels amount in 10 consecutive frames

  F3 –   Average value of elements quantity which have changed for the period of N frames

  F4 –   Changed pixels maximum frequency during N processed frames

  F5 –   Ratio of «high» frequency density to «low» frequency for parameter F1. Characterized tension parameter.

  F6 –   F5 – current tension level (%)

  F7 –   Average value of the F1 parameter period (in seconds), determined during readout F6N. Value of parameter F6N is set in section [Filters] an information column in a mode of system parameters setup and defines quantity of the frame processed in Fast Processing mode

  F8 –   F6 – Inhibition parameter

  F9 **–**   Root-mean-square deviation for F6 parameter

  The group of parameters S1-S7 registers symmetry of vibrations between left and right parts of person body:

  S1 –   Ratio (symmetry) of amplitude left to the right changed pixels inside the object in 2 consecutive frames

S2 – Difference between the left and right average amplitude of object vibration in 10 frames

S3 – Difference between the left and right average amplitude of object vibration in N frames

S4 – Ratio of the changed pixels quantity in the left part of object to the changed pixels in the right part in 2 consecutive frames

S5 – Ratio of the changed pixels quantity in the left object part to the changed pixels quantity in the right object part calculated in 10 frames

S6 – Ratio of the changed pixels quantity in the left object part to the changed pixels quantity in the right object part calculated in N frames

S7 – Difference between the maximal frequency of vibrations of the left and right object parts in N frames

The group of parameters P1-P4 registers features of mathematical Processing of vibrations:

P1 – Dispersion of vibration density for frequency distribution at 10 processing frames

P2 – Dispersion of vibration density for frequency distribution at N processing frames

P3 – Center density distribution displacement of frequency at 10 processing frames

P4 – Center density distribution displacement of frequency at N processing frames

- Current values of fast processing VibraStaff parameters A1 fast, A4 fast, F1 fast, F5 fast;

- Basic parameters describing psycho-emotional condition of the person: Aggression, Stress, Tension/Anxiety, Suspect, Balance, Charm, Energy, Self-regulation, Inhibition, Neuroticism.

- For each parameter the following numerical values are displayed:

V – The value of the parameter average for the set period

S – root-mean-square deviation of parameter

cMin – The minimal value of parameter for the period

cMax – The maximal value of parameter for the period

NMin – The minimal value of parameter for a normal condition of the person

NMax – The maximal value of parameter for a normal condition of the person

Note, values of cMin, cMax parameter, are displayed only when measurement mode «M» has been began and the information for the specified period of time is saved up.

Note, after ending of the information accumulation some lines of an information column can be allocated by color:

- ▮ **-** parameters, which values less than the set limits are allocated.
- ▮ **-** parameters, which values more than the set limits are allocated.

Note, for correct diagnostics psycho-emotion conditions of the person speed of data input from the camera should be within the limits of 25-30 frame/second.

After the end of the information gathering, the results of the "frequency analysis" and the results of the analysis of the change in the person's psychophysiological state will be available. To do this, open the corresponding tab in the main image window (see Fig. 3.21, 3.22).
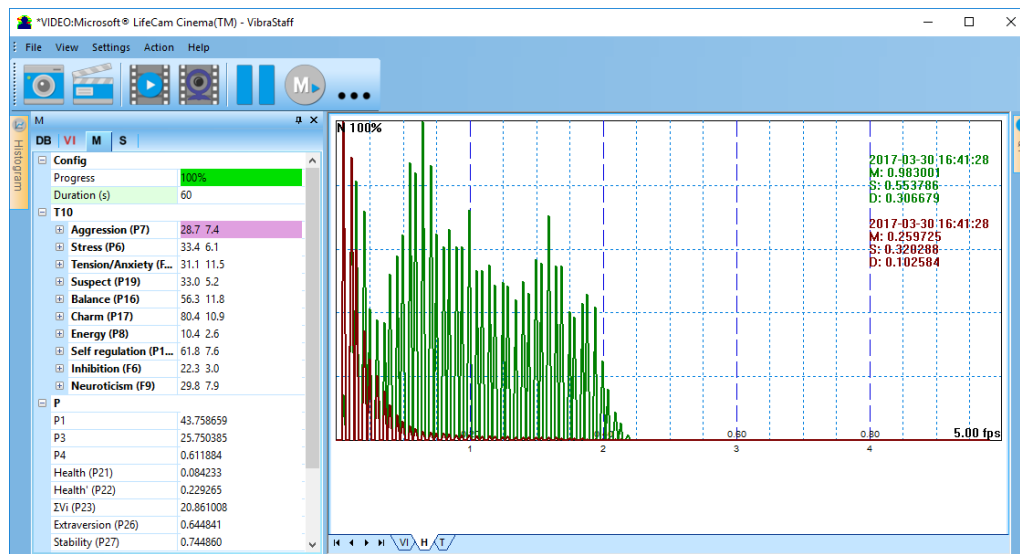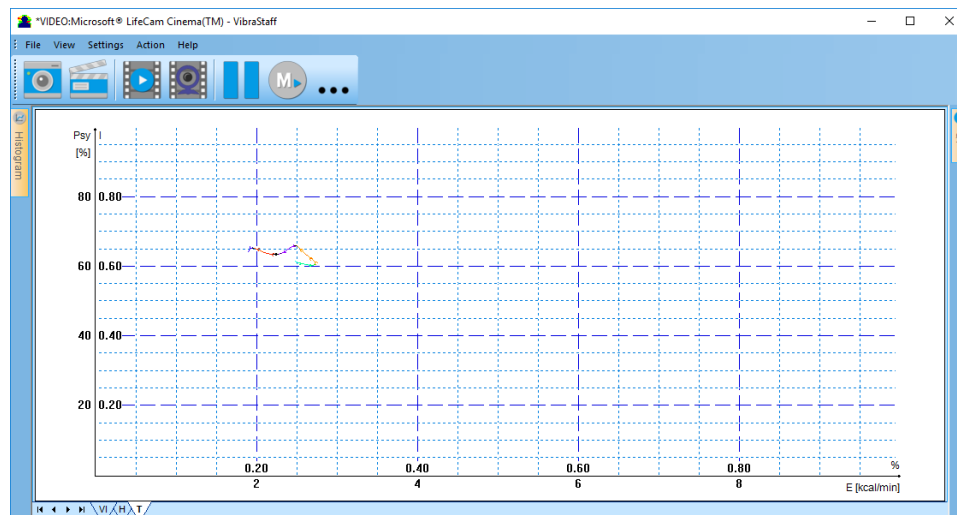

Fig. 3.21. Results of frequency analysis

Fig. 3.22. Psycho-information graph

The graphs are saved to an external file automatically after the measurement is completed.

3.4.3. Information table

Information table (fig. 3.21) allows adjusting vibraimage parameters and displays the following information:

Frame Rate Settings

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»
Apply global filter	If this parameter is included, all the remaining calculated parameters change on processed by filters.

S		
Frame rate		
Fast processing	0.0	
Base processing	5.0	
FPS proc. period	2.00	
Downrate	0	
Main		
N(2)	2	
N(10)	10	
N	100	
L	2.00	
Apply global filter	No	
Filters		
Single points	Yes	
Extended	8	
Extended (fast)	8	
Stretch	No	
Max speed contour	No	
Am scale	16	
Space	4	
color image	No	
Crop		
crop X	0	
crop Y	0	
crop X pos	0	
crop Y pos	0	
F6		
F6 HF	0	
F6 LF	10	
F6 N	100	
FPS filter	No	
E-Monster	No	
Auto downrate	No	
Fixed contour	No	
Stab. X	No	
Stab. Y	No	
State levels		
Ag	80	
St	80	
Tn	80	
disable *		
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	
Motion detector		
Motion detector	No	
level	0.1	
auto reset	No	
skip frames	20	
LD's global		
Enable	No	
Stat period (s)	10	
Base period (s)	3	
Lie threshold	25	
Audio sens. (s)	5	
Audio level	30	
Opposite mode	No	
LD mode	Audio	
Compare	Off	
Text	No	
AVG filter		
Aggression	10	
Stress	10	
Tension	10	
Suspicious	0	
Quality test	Yes	
Enable	Yes	
light level	5	
FPS max	100	
FPS min	24	
face delay	2	
Fn		
X1		
X2		
X3		
X4		
X5		

Fig. 3.21.Information table

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 Extended
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
Space	Reduce vibraimage on borders of motionless contrast objects.
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.
E-Monster	Switch to the E-monster mode. The program opens the person face deformed by latent emotions though externally he can constrain these emotions. If the emotional condition of the person is like to normal, then the the program image is like to real video. Accordingly, than more emotions overflows the person and then more especially deformed his image in Monsters Detector mode (E-Monster) (fig.3.46).

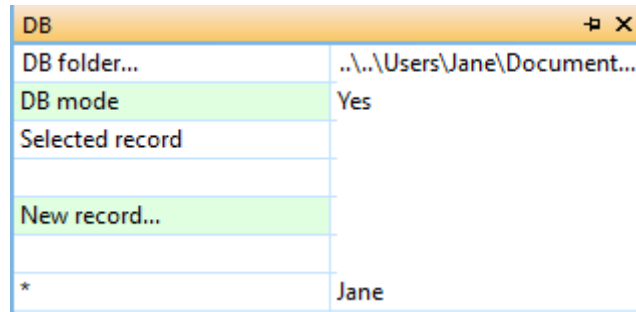|	
Auto downrate	Automatic calculation of **Downrate** parameter is made in view of frequency of the input frames, Base processing frequency and computing capacity of a computer.
Fixed contour	In this mode vibra-aura around the human contour will be built around a fixed path, and not to repeat the contours of the body.
Stab. X	Image stabilization in the X coordinate entered when significant vibrations image on the X-axis.
Stab. Y	Image stabilization in the Y coordinate entered when significant vibrations image on the Y-axis.
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.
Disable	**Note**: Canceling of parameter calculation is use for increase calculation speed of other parameters.
Disable Am	Canceling of vibration amplitude calculation.
Disable F	Canceling of vibration frequency calculation.
Disable 2x(fast)	Canceling of 2 frames parameters fast calculation.
Disable VI(10)	Canceling of 10 frames parameters calculation.
Disable VI(2)	Canceling of 2 frames parameters calculation.
Disable FFT	Canceling of Fast Fourier Transformation frequency processing.
Disable Entropy	Canceling of Entropy processing.
Disable Audio	Canceling audio analysis.
Motion detector	
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.

Lie detection

Enable	Enable LD mode.
Stat periods	Before you begin the process of «lie detection» system during
Base periods	the **«Base period»** (in seconds) collects information to determine the maximum and minimum current values of human parameters that then at «lie detection» time during the **«Stat period»** define «abnormal» change individual values parameters.
Lie threshold	Threshold (in %) for the detection of lie level in view of every calculated parameters and their «weights».
Audio sens. (s)	After the ending of answer, the system continues to expect «lie» calculation during the specified time interval.
Audio level	The sound level used to start / stop lies detection process in the «Audio» mode.
Opposite mode	Alternative method of lie level calculation.
LD mode:	Selection of mode for lie detection.
Audio	Calculation of lie level starts when the level of entrance audio signal exceeds the established threshold. LD calculation stops, when the level of audio signal becomes less than the established threshold
Manual	Accumulation of the information is made in time «Base periods». Calculation of lie level is made only after pressing button «Start LD» , the end of processing - after repeated pressing this button.
Auto	Calculation of a lie level works constantly, current values of parameters (Stat period) are compared to values processed for previous Base period.
Compare	**Off** - at the analysis of lie, as test, the interval «Base periods» directly till the moment of started lie detection is used. **On** - at the analysis of lie, as test, the interval «Base periods» which has been marked by the user beforehand is used. When the user includes accumulation the preliminary information, in this field value **«Capture».**
Text	Switch on/off display «text questions» in «LD Question» window.

AVG filter

Aggression	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 |

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).
Min size, Max size	Sets in pixels the size of rectangle for search of persons
Config	In VibraStaff software for person search use basic algorithm ocv_face.xml only.
Draw	No – not draw rectangle around face, Yes – draw rectangle around more danger single person, 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», than rectangle draw red color.

Quality test

Enable	Switch on mode of automatical check of image quality (see point 2.3.1)
Light level	Parameter use for define image noise level when illumination is low.
FPS max, FPS min	Maximum and Minimum allowable input frame rate.
Face delay	This parameter determines how long (in seconds) the program can not recognize a human face in the frame before you will get an error message.

Fn

| X1-X5 | In VibraImage program user can form itself formulas for calculation of new parameters of vibraimage, using any vibraimage parameters. For example (fig. 3.47). |

3.4.4. Information column. DB (data base) mode.

In the «**DB**» mode information column (fig. 3.22) adjusts parameters of recorded video information and shows the following information:

Fig. 3.22. Information column in the DB mode

- «**DB folder**» – way to the database folder for written video files and files of statistics;

- «**DB mode**» – switch on/off DB mode;

- «**Selected record**» – data on current object of research;

- «**New record**» –information about object of research. To delete new record it is necessary to delete the data folder on a disk and having selected the «**DB folder**» item again to select the folder for saving.

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4 VibraStaff. Measurement and control of operator functional state and critical psychophysiological parameters

VibraStaff main program objective is measuring psychophysiological parameters of person and testing person functional state. It is known that the functional and psychophysiological state of a person are constantly changing under the influence of external and internal factors.

VibraStaff system allows to measure and examine the functional and physiological parameters of a person as an objective, as there is measurement of physical quantities, in no way connected with the person or biometrics, because it directly measured physical parameters of the head movement which are functionally linked to functional state by vestibule-emotional reflex.

4.1. M mode

The average values of personal psychophysiological parameters, their deviation and variability are measured in the «**M**» mode. The main goals of this mode are application of vibraimage system for accuracy security checking, medical diagnostics and psychological testing and researches. M mode is based on measurement and calculation of psychophysiological parameters T1–T10 and checking its math variability during testing period. For vibraimage visual control in this chapter are given the pictures characterizing changes of said psychophysiological parameters T1–T10.

The mathematical expectation M, standard deviation (SD) S and variability V (S are calculating for the following human psychophysiological parameters:

T1 – Aggression (P7)
The parameter is determined by the frequency histogram and represents the maximum allocation of the frequency and SD vibration frequency of the human face. The higher value of the maximum distribution and higher SD value gives the greater value of the parameter T1.

Aggressive state is not every time coordinates with tension, and tension state is not always coordinates with aggression. But often these two emotions accompany each other. Aggressive state obligatory characterized by high frequency vibrations and red colors in aura. Aura size is more than normal and gaps could absent, but color and form non uniformity must present (fig 4.1b). Stress level could be low, less than 0,3. Anger level more than 0,7 and tension level more than 0,4.

Frequency histogram distribution has maximum in right part of the range and distribution has amount dispersion. High speed signals spectrum envelope looks like uniform distribution.
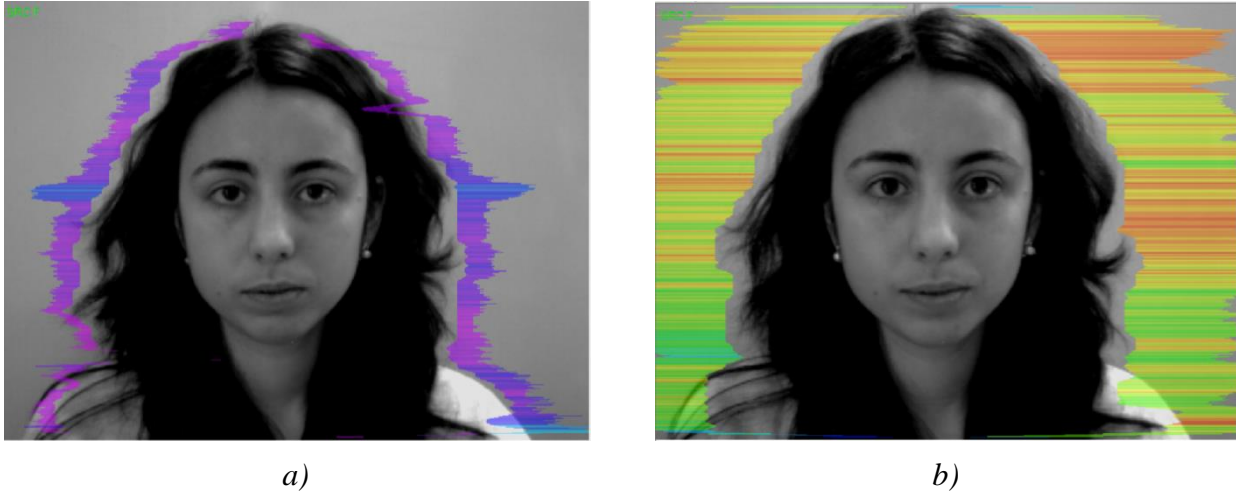
a)   *b)*

Fig. 4.1 Aggression a) T1 = 18 %, b) T1 = 60 %

T2 – Stress (P6)

Parameter is determined by degree of the external vibraimage (vibra-aura) asymmetry, means asymmetry of micromovements from the left and right parts of the persons head. The great difference in amplitude and frequency movements for the left and right parts of the face (head) characterizes the increased T2 parameter level.

Stress state characterized by amount gaps in aura form and greatly aura colors non uniformity. Aura includes every scale colors and sharp color transfer, like red color could transfer to blue (fig 4.2b). Stress level more than 0,7. Aggression or activity level is low, not more than 0,5 and tension level is high and usually more than 0,4.

Frequency distribution histogram has several modes and high speed vibraimage signals spectrum presents superposition of exponential and uniform distributions.

a)   *b)*
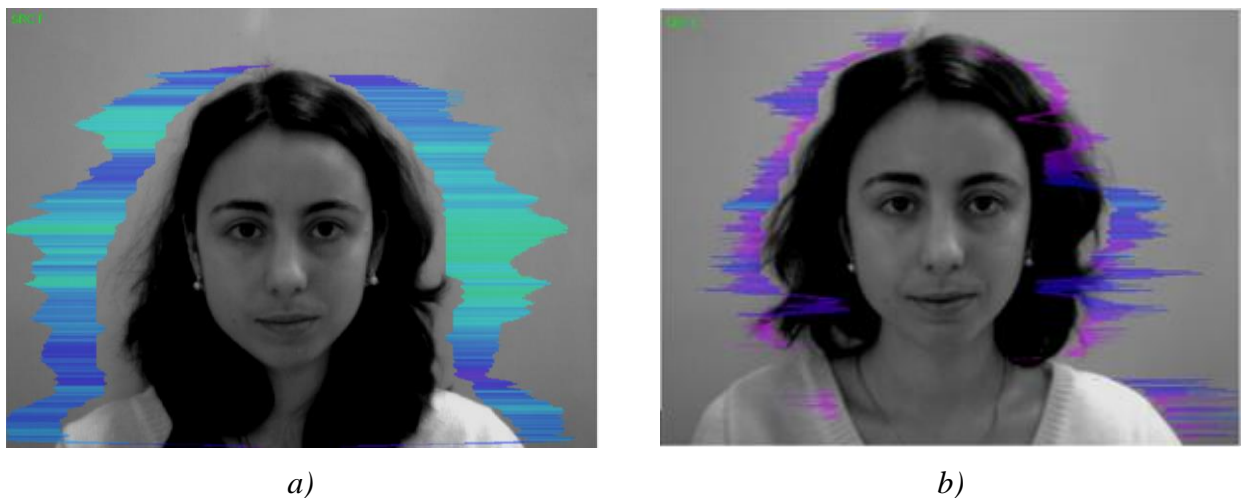
Fig. 4.2 Stress a) T2 = 17 %, b) T2 = 45 %

T3 – Tension/Anxiety (F5X)

Parameter is determined by the relation of high-frequency part of a range of vibrations to the general power in a range of micromovements frequency for human head. High value of high-frequency vibrations density characterizes high value of the T3 parameter.
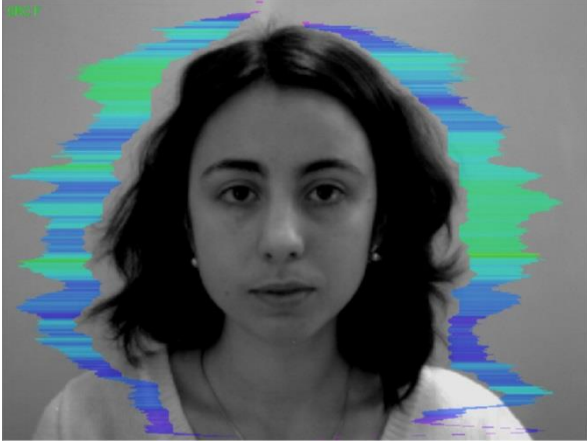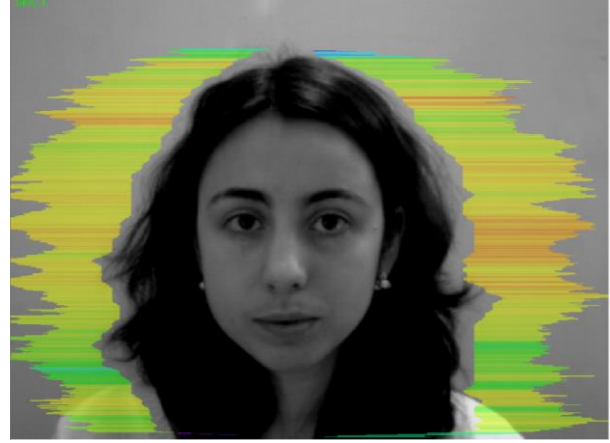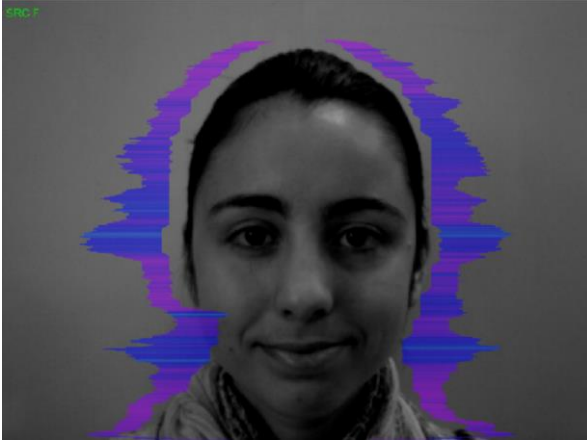

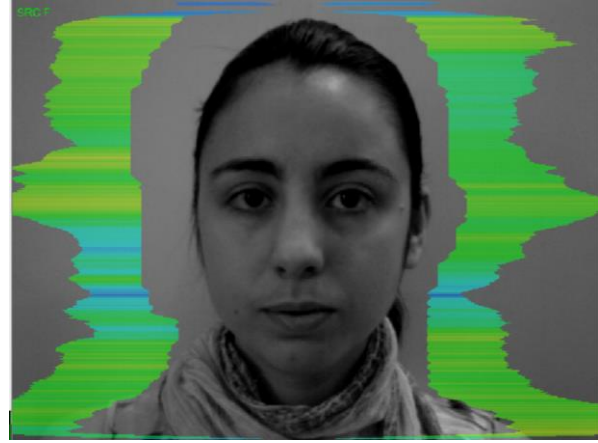*a)*   *b)*

Fig. 4.3 Tension a) T3 = 28 %, b) T3 = 48 %

T4 – Suspect (P19)

The parameter is determined as the sum average of the first three conditionally negative emotions (T1, T2, T3) and characterizes the general level of conditionally negative emotions in a person status.


a)   *b)*

Fig. 4.4 Suspect a) T4 = 20 %, b) T4 = 65 %

T5 – Balance (P16)

The parameter is determined by the frequency histogram and characterizes the level of similarity of the current frequency histogram to the Gaussian distribution law. The high level of frequency histogram similarity to the normal law is characterized by a high level of balance, and significant deviation from the Gaussian distribution is characterized by a low level of the parameter T5.
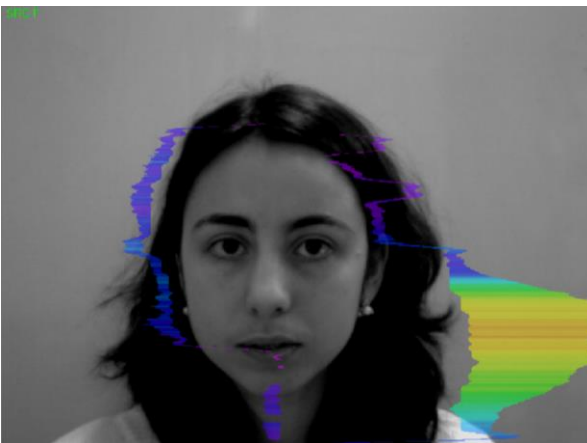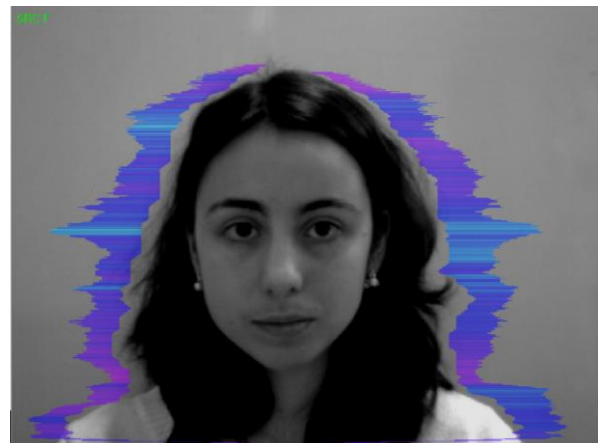
a)   *b)*

Fig. 4.5 Balance a) T5 = 10 %, b) T5 = 80 %

T6 – Charm (P17)

The parameter is determined by the symmetry (left-right) of the head and face micromovements, the maximum symmetry of movements (including frequency and amplitude) represents a high level of charm T6.
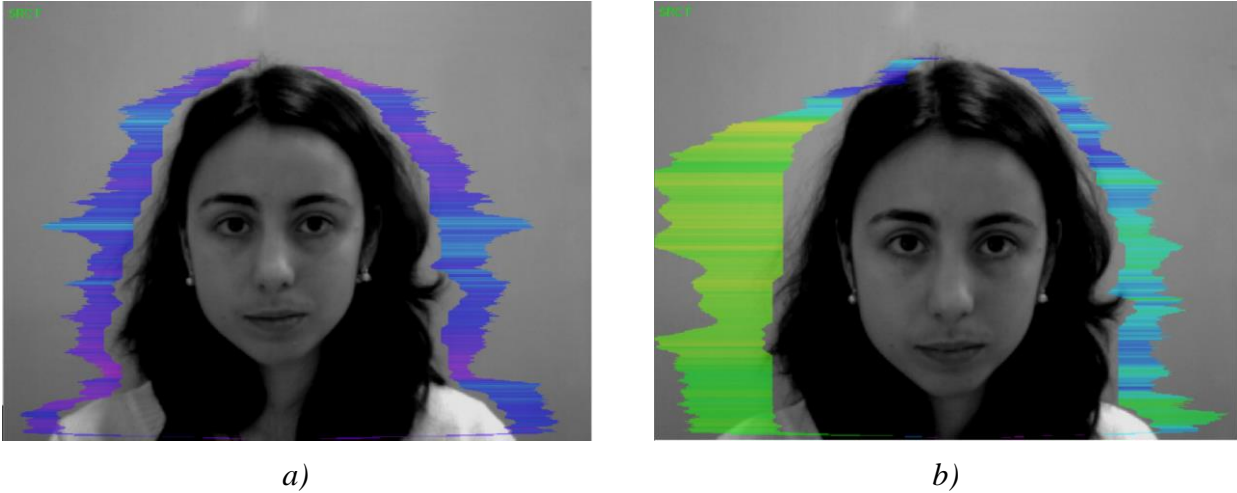

<div align="center">a)   b)</div>

Fig. 4.6 Charm a) T6 = 85 %, b) T6 = 40 %

T7 – Energy (P8)

The parameter is determined by the frequency histogram and characterizes the difference of the maximum density of the vibration frequency and vibration frequency SD for the face and human head. The higher value of the maximum density and lower SD or variation of vibration gives the higher value of energy T7.
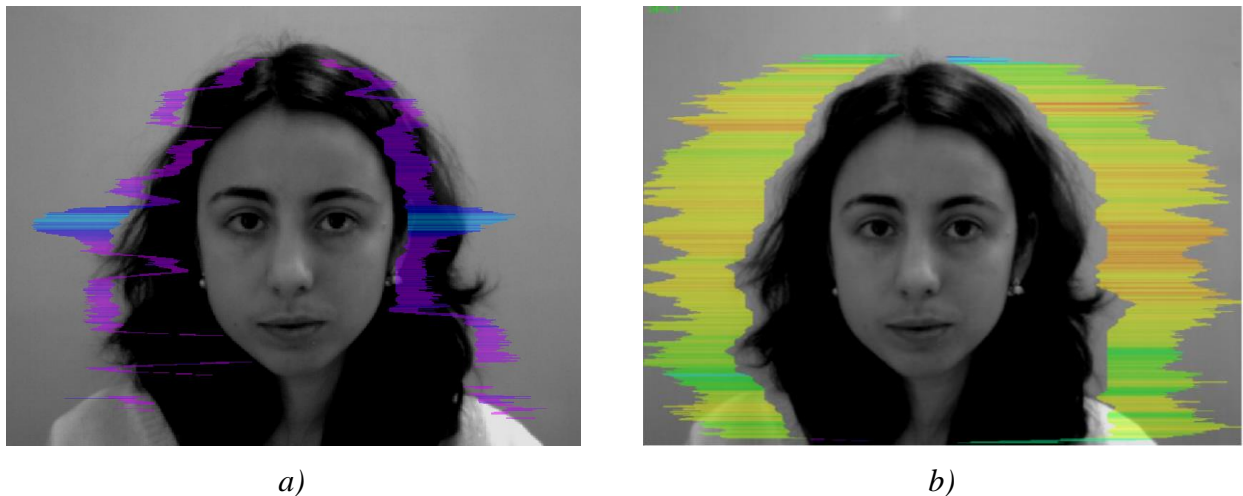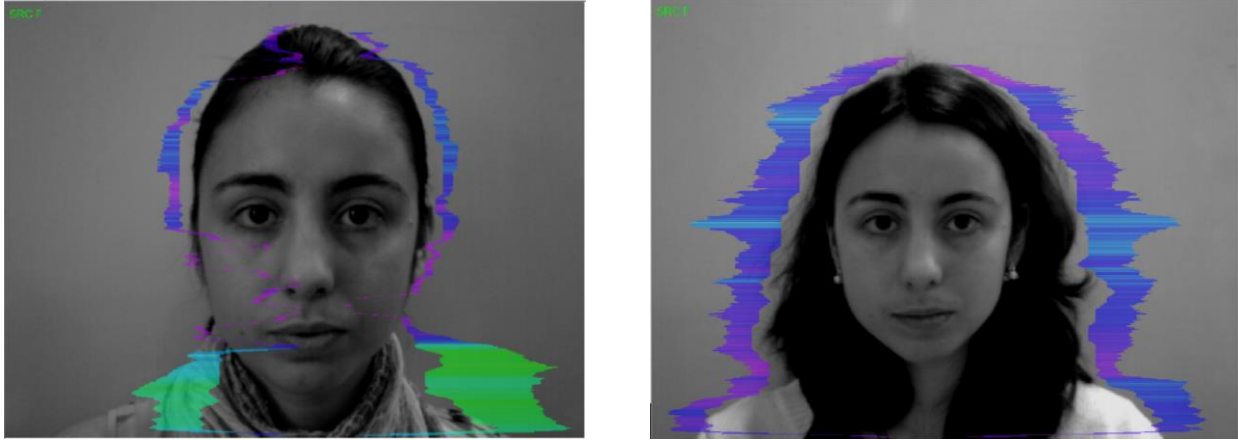

<div align="center">a)   b)</div>

Fig. 4.7 Energy a) T7 = 3 %, b) T7 = 70 %

T8 – Selfregulation (P18)

The parameter is determined as the sum average for conditionally positive emotions (T5, T6) and characterizes the general level of conditionally positive person emotions at the measurement time.
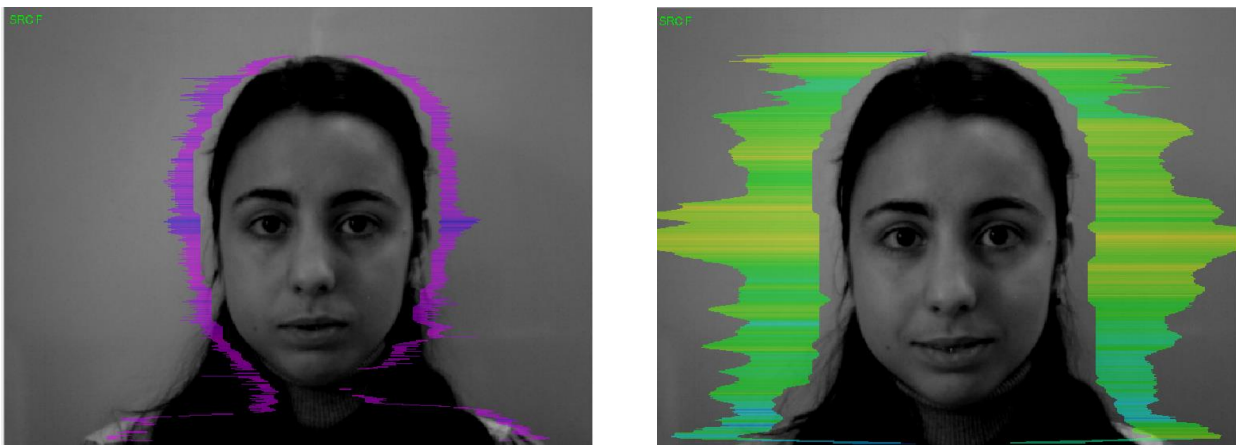

a)   *b)*

Fig. 4.8 Selfregulation a) T8 = 30 %, b) T8 = 80 %

T9 – Inhibition (F6)

It has a real physical dimension (time in seconds) and characterizes the minimum time of the person reaction for the shown event (the stimulus). The value of the parameter T1 = 0,1 means that the reaction time is 0,1 s. The greater the reaction time corresponds to a higher level of inhibition.

a)   *b)*

Fig. 4.9 Inhibition a) T9 = 12 %, b) T9 = 25 %

T10 – Neuroticism (F9)

The parameter characterizes the SD measured value of the inhibition level (T9) at the measurement time (default 60 seconds). High level for inhibition SD of psycho‑physiological state characterized by instability and indicates high level of neuroticism T10.
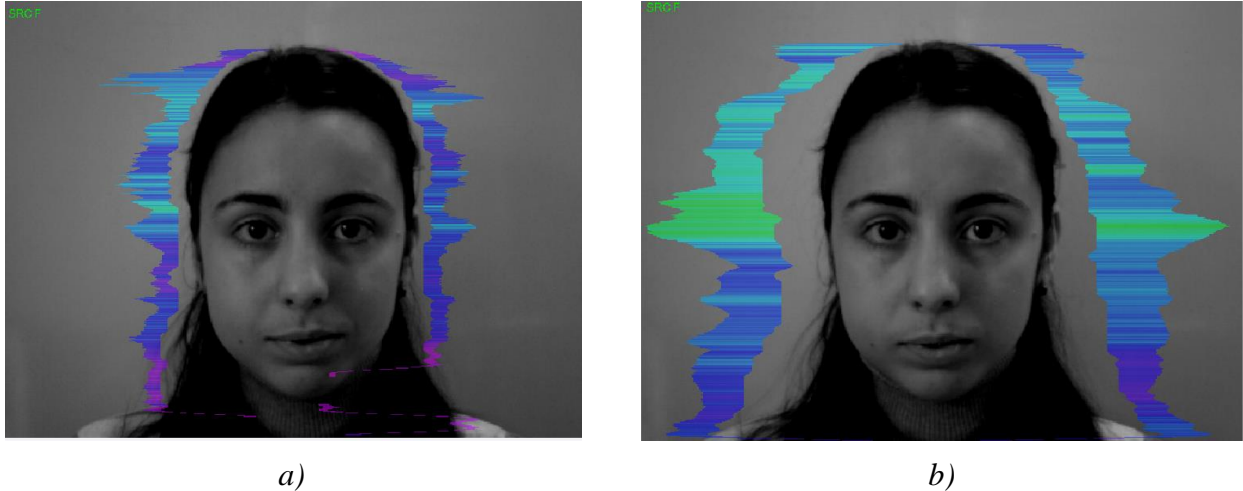

a)   *b)*

Fig. 4.10 Neuroticism a) T10 = 10 %, b) T10 = 35 %

Mathematical formulas on which basic there is a T1–T10 parameters calculation, are resulted in the description of the Vibraimage statistical analysis software (VibraStat).

Set of the T1–T10 parameters is selected so that with the maximum information content to record all micromovements of a human head. Thus, the name of each T_i parameter can characterize different psychophysiological characteristics depending on use of VibraStaff. For the characteristic of each parameter its name is primary not, it can be read the conditional, and a formula by which this parameter is determined.

Note:

1. All measured by vibraimage system psychophysiological parameters are resulted in a range of 0 – 1 (0 – 100) % with the use of experimentally picked up fixed factors specified in formulas.

2. For everyone measured psychophysiological parameter the mathematical formula is primary, and secondary the conditional name of parameter. The psychophysiological sense of each T1–T10 parameter can change depending on conditions of experiments.

3. Set of measured parameters T1–T10 defines the general psychophysiological (psychosomatically, functional) a condition of the person on the basis of integrated coefficient K.

Note:

This brief vibraimage parameters interpretation correspond default vibraimage system settings and based on main rules for right vibraimage scanning:

- uniform and stable object illumination;

- high quality and low nose camera application;

- frontal plane object before camera;

- maximum facial image size on monitor;

- mechanical stabilization of camera.

4.2 Viewing of psychophysiological testing results

After the end of information processing in a mode «M» user (operator or examiner) can view testing results in one file for person of the «*.xls» format in folder /VibraStaff/_default/. Contents of this file are supplemented with each new inspection of this person. The example of the contents of such file is given in a fig. 4.11.

The most important for the analysis in XLS a file are the following sheets
- **Sheet T.** Contains person test results based on the analysis of risk indexes parameters N1–N5 using the calculation method for the three intervals (Fig. 4.11)
- **Sheet T2.** Containing person testing results based on the analysis of the basic physiological parameters T1 – T10 using the calculation method for the three intervals (Fig. 4.12).
- **Sheet T2a.** Contains person test results based on the analysis of the main physiological parameters T1 – T10 to suit the individual norms limit of this concrete person (Fig . 4.13).
- **Sheet T2b.** Contains person test results based on the analysis of the main physiological parameters T1 – T10 to suit the norms limit rules for the majority of people (Fig . 4.14).
- **Sheet Diag.** Contains graphs of all psycho-physiological and psycho-emotional parameters of the person during the inspection , as well as registers the output parameter values beyond the normal state of human values (Fig . 4.15).

    Depends on testing method user can select the base mode for the final solution from T, T2, T2a and T2b sheets.

Fig. 4.11. Viewing of researches results. Sheet T.

Note, on sheets T, T2, T2a, T2b the following color marks of cells is used:

- ⬜ – parameters, which values less than the set norms level for this person

- ⬜ – parameters, which values near of norms level for this person and norms level separate excess are possible

- ⬜ – parameters, which values stable more than the set norms level for this person.

Fig. 4.12. Viewing of researches results. Sheet T2.

name	parameter	lower bound	average value	upper bound	out of bounds
	According to the pre-shift control the psychophysiological state				
	beyond the 95% limit of normal.				
	NOT ALLOWED to work.				
T1	Aggression	46,849	46,849	46,849	No
T2	Stress	22,383	22,383	22,383	No
T3	Tension	10,453	10,453	10,453	No
T4	Suspect	26,046	26,046	26,046	No
T5	Balance	71,548	71,548	71,548	No
T6	Charm	80,984	80,984	80,984	No
T7	Energy	37,723	37,723	37,723	No
T8	Self regulation	75,985	75,985	75,985	No
T9	Inhibition	22,840	22,840	22,840	No
T10	Neuroticism	79,180	79,180	79,180	No
	Static levels		2,000		Yes
	Quality		100,000		No

Delete record

Fig. 4.13. Viewing of researches results. Sheet T2a.

name	parameter	lower bound	average value	upper bound	out of bounds
	According to the pre-shift control the psychophysiological state				
	beyond the 95% limit of normal.				
	NOT ALLOWED to work.				
T1	Aggression	20	46,8	50	No
T2	Stress	15	22,4	40	No
T3	Tension	15	10,5	40	Yes
T4	Suspect	20	26,0	50	No
T5	Balance	50	71,5	100	No
T6	Charm	40	81,0	100	No
T7	Energy	10	37,7	50	No
T8	Self regulation	50	76,0	100	No
T9	Inhibition	10	22,8	25	No
T10	Neuroticism	10	79,2	60	Yes

Fig. 4.14. Viewing of researches results. Sheet T2b

Note, on sheet T2a (fig. 4.13) shows results of the analysis psychophysiological parameters of the person with the control of their values over individual norm for the given concrete person. As a result of all control parameters T1 – T10 are marked «green color», i.e. they are in the established limits for a given person. But the final result check the status is a negative **«NOT ALLOWED to work»**. Simultaneously with check of the current parameters of the person on his individual norm in the program the control of the current parameters of the person over average norms (see Sheet T2b, fig. 4.14), and on these norms at the given person have increased levels of «Tension» and «Neuroticism», therefore and final result – «NOT ALLOWED to work».

Thus, to the user the program offers 4 methods of calculation of the current person state (Sheets T, T2, T2a, T2b). On the basis of the experience the user can choose one method of calculation for the work, open in MS Excel file a sheet of calculations of this method and close a file xls with save of changes in a file. Now at the subsequent researches of the person on the screen results of calculations on the chosen method will open by default.
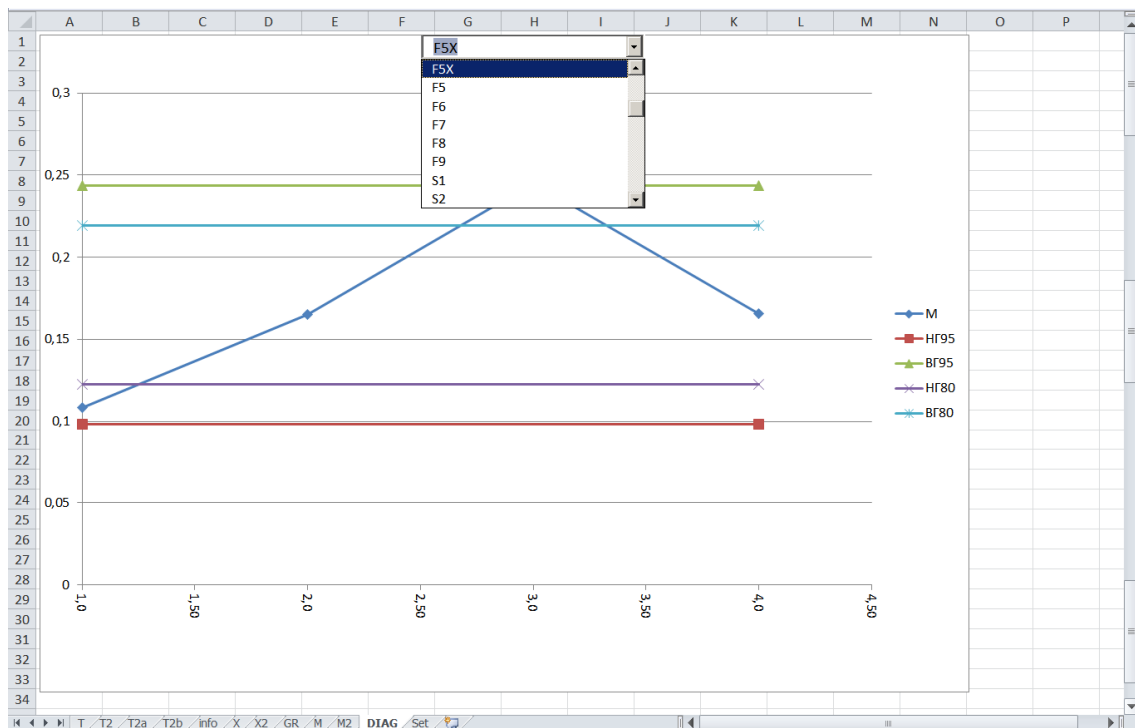

Fig. 4.15. Viewing of researches results. Sheet Diag.

Sheet Diag contain graph of change of all psychophysiological and psychoemotional parameters of the person during inspection (fig. 4.15):
- Parameters A1**-**A4, F1**-**F9, S1**-**S7, P1**-**P4.
- Parameters P16 (Balance), P17 (Charm). P18 (Self-regulation), P19 (Suspect level), F5X (Tension), F6 (Inhibition), F9 (Neuroticism), P21**-**P23 (Health level), P26 (Extraversion level), P27 (Stability level), P6 (Stress), P7 (Aggression), P8 (Energy).

- Parameters FN01-FN10 (Formulas of given parameters calculations are programmed by the user independently).
- Parameters «Risk an index», «Level of stressing», «Level of stability», «Level of activation PF», « Level of self-control».

Note, on graph different colors marked horizontal line of 80 % and 95 % confidential borders from norm.

5. Warranty

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

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