

Emotion Recognition and Lie Detection System

VibraLite

Version 7.3

User Manual

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1. Introduction

1.1. Basic applications

VibraLite software solves the following aims:

- Emotions recognition and quantitative measurement of emotions;
- Vibraimage real time surveillance, research and control;
- Aura (external vibraimage) real time surveillance, research, analysis and interpretation;
- Control over changes in psychophysiological state of person;
- Personal compatibility;
- Psychophysiological detection of deception, lie detection;
- Medical psychophysiological personal diagnostics based on corresponding statistic norms;
- Monsters detection

VibraLite program has several modification. The choice of modifications is carried out at a stage of software installation. Note, each of 12 modification requests a separate key for authorization. Every VibraLite modification is program independent from the other modifications.

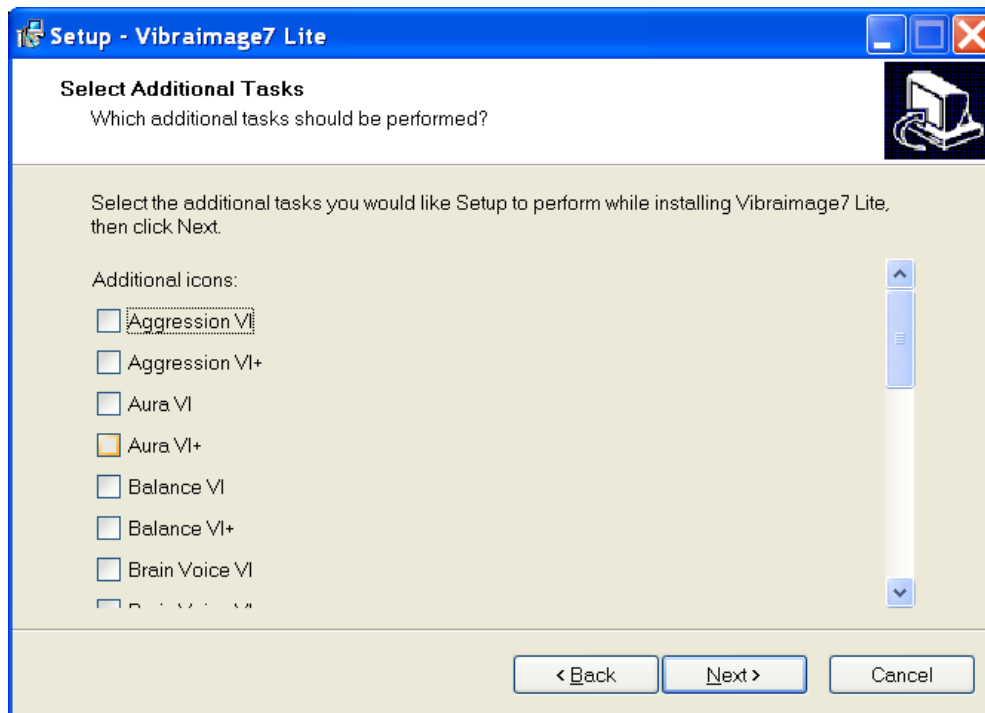


Fig. 1. VibraLite modification choice

1. Aggression VI – detection and quantitative measurement of aggression (activity) personal level as one of the base human emotions. Every person has some aggression or activity level and low aggression level is the same pathology as high aggression level. User could control his own aggression level, or aggression of friends, partners and any controlled person.

2. Aura VI – indication of the personal aura (external vibraimage), visualized by vibraimage technology.

3. Balance VI – detection and quantitative measurement of personal mental balance, balance scale in % from 0-100, the best mental balance state corresponds to 100% .

4. Brain Voice VI – audio indication of person aura, visualized by vibraimage technology.

5. Biotester VI - quantitative measurement of psychological-energy changes in personal state, calculation of person energy in kkal/min, psychological state in % from 0-100, the best psychological state corresponds to 100%

6. Charming VI – quantitative measurement of personal charming level, charming scale in % from (0-100)%, the best charming state corresponds to 100%

7. Compatibility VI - quantitative measurement and testing of couple compatibility for lovers, friends, familiar, partners etc. Compatibility scale in % from (0-100)%, the best compatibility corresponds to 100%

8. Energy VI - quantitative measurement of personal energy level, energy scale in % from (0-100)%, the maximum energy corresponds to 100%

9. Stress VI - Some of scientists don't correspond stress with emotions, however, nowadays stress is the most popular term characterizing human mental state. **VibraImage** allows fairly analyze own or others stress level, that is important for regular mental health control, also as precautions, rehabilitation and cure for depression states. Stress scale in % from 0-100, the maximum stress corresponds to 100%

10. Suspect VI – quantitative measurement of personal suspect level (potential danger of person) by calculation of aggression, stress and anxiety levels. Suspect scale in % from 0-100, the maximum suspect corresponds to 100%

11. Tension VI - Anxiety (fear, tension) presents physical emotion realization, produced by any alarm, independently from conscious or unconscious of this state by person. **VibraImage** program intends for anxiety level analyzing, allows to indicate unconscious alarm and fear, so assists in it medical treatment. Anxiety scale in % from 0-100, the maximum anxiety corresponds to 100%

12. VibraLie – psychophysiological detection of deception based on vibraimage technology. Contactless high sensitive detection of psychophysiological response during examination and auto lie calculation based on suggested MCQT method.

13. E-Monster - Program shows facial image of person changed by emotions. You could detect monsters by this program even if person is hidden emotions under the mask of normal face.

If in the name of the program there is a sign «+», for example **Energy VI +**, it means that this updating of the program additionally supports work with program **Skype**.

All parameters are calculated in a range from 0 up to 100 %, the greater value of parameter corresponds to the greater calculated value.

1.2. Specifications

1.2.1. VibraLite system data

- Resolution, TVL, more than 400
- Noise level of VibraImage, bit, less than 0,1
- Frame speed, frame/sec 15-30
- Frequency range, Hz, more than $0,1 \div 15$

1.2.2. Digital (web) camera requirements

- Sensor CCD or CMOS Sensor
- Resolution, pixel. From 640 x 480 till 1280 x 1024
- USB compatible USB 1.0, USB 2.0
- Frame speed, f/s, more than 15 ((25- 30) for VibraLie)
- Microphone external
- Exposition control auto and manual
- Color mode color and B/W switch
- Flicker mode Flicker 50Hz and 60Hz

1.2.3. System requirements for local module computer

Operation System	Windows XP Prof/Vista with DirectX 9.0 or later
Processor	PC with Pentium Core 2 Duo 2500 MHz, or better
RAM	1024MB or better
HDD	100GB or more free space
DVD-ROM	DVDRW
USB port	1free USB ports version USB 2.0
PCI slot	1 free slot (option)
Video capture	WDM-compatible video device

1.3. Package contents

1.	VibraImage Lite software	-	1
2.	Internet key	-	1
2.	User manual	-	1
3.	Digital USB camera (options)	-	1
4.	Microphone (options)	-	1
5.	Personal computer (options)	-	1

2. **Vibra**Lite software installation

It is necessary to execute the following actions for installation of **VibraImageLite** program on your computer:

1. Go to Web page http://www.elsys.ru/downloads_e.php#Vibraimage7Lite.zip
2. Load file <http://www.elsys.ru/downloads/Vibraimage7Lite.zip>
3. Run file Vibraimage7Lite.exe from archive file;
4. Select language for installation procedure;
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)



Fig. 2. *VibraLite* modification

10. Press button «Install» at the start of installation.
11. If you want to have the VibraLite program in the other modification, in the appeared window it is necessary to choose item of installation of virtual camera drivers, and press «Next».
12. Press button «Finish» at the end of installation.
13. **VibraLite** program pictograms appears after the end of installation in system menu and on desktop of your computer.
14. To reboot a computer.

Note, if it is necessary to install some updatings of VibraImageLite program, after start of a installation file in the opened window of a modifications choice (see. Fig. 2) it is necessary not only to specify the new chosen the program updatings, but also, corresponding ticks to confirm work with all old already installed the program modifications.

2.1. **VibraLite** software activation

Attention!

1. Procedure of activation is made once at the first start of the program.
2. The received serial key for activation can be used only once.
3. Activation procedure demands access to the Internet for acknowledgement key from server.
4. Each key of activation is intended for work with its «version» of the program.

Key type	Software «version»
VI7_XXXXXXXX_C	Compatibility VI software is intended for check of compatibility of two people
VI7_XXXXXXXX_DC	Compatibility VI+ software is intended for check of compatibility of two people with Skype support
VI7_XXXXXXXX_A	Aggression VI software is intended for check anger level of person
VI7_XXXXXXXX_DA	Aggression VI+ software is intended for check anger level of person with Skype support
VI7_XXXXXXXX_Z	Aura VI software is intended for check aura and vibraimage of person
VI7_XXXXXXXX_DZ	Aura VI+ software is intended for check aura and vibraimage of person with Skype support

VI7_XXXXXXXX_K	Biotester VI software is intended for check aura and vibraimage of person, its frequency histograms
VI7_XXXXXXXX_DK	Biotester VI+ software is intended for check aura and vibraimage of person, its frequency histograms and with Skype support
VI7_XXXXXXXX_V	Brain Voice VI software is intended for check «sound aura» of person
VI7_XXXXXXXX_DV	Brain Voice VI+ software is intended for check «sound aura» of person with Skype support
VI7_XXXXXXXX_D	Suspect VI software is intended for check suspect level of person
VI7_XXXXXXXX_DD	Suspect VI+ software is intended for check suspect level of person with Skype support
VI7_XXXXXXXX_S	Stress VI software is intended for check stress level of person
VI7_XXXXXXXX_DS	Stress VI+ software is intended for check stress level of person with Skype support
VI7_XXXXXXXX_T	Tension VI software is intended for check tension level of person
VI7_XXXXXXXX_DT	Tension VI+ software is intended for check tension level of person with Skype support
VI7_XXXXXXXX_B	Balance VI software is intended for check balance level of person
VI7_XXXXXXXX_DB	Balance VI+ software is intended for check balance level of person with Skype support
VI7_XXXXXXXX_H	Charming VI software is intended for check charm level of person
VI7_XXXXXXXX_DH	Charming VI+ software is intended for check charm level of person with Skype support
VI7_XXXXXXXX_E	Energy VI software is intended for check energy level of person
VI7_XXXXXXXX_DE	Energy VI+ software is intended for check energy level of person with Skype support
VI7_XXXXXXXX_L	VibraLie program for psychophysiological detection of deception (Lie detector)
VI7_XXXXXXXX_LD	VibraLie+ program for contactless psychophysiological detection of deception. Lie detector with Skype support.
VI7_XXXXXXXX_M	E-Monster program shows facial image of person changed by emotions. You could detect monsters by this program even if person is hidden emotions under the mask of normal face.
VI7_XXXXXXXX_MD	E-Monster+ program shows facial image of person changed by emotions. You could detect monsters by this program even if person is hidden emotions under the mask of normal face. Available in Skype.

Activation procedure:

1. For the activation beginning it is necessary to start the program.
2. At the first start of the program the activation window (Fig. 3) will be displayed.

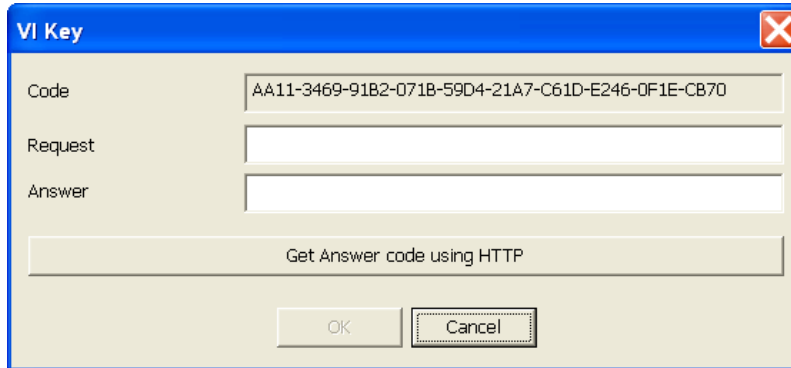


Fig. 3. Activation window

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

Please, be careful and paste code without additional gaps!

4. The activation key will be checked up through the Internet and, in case of successful end of activation procedure, the acknowledgement code (Fig. 4) will be sent.

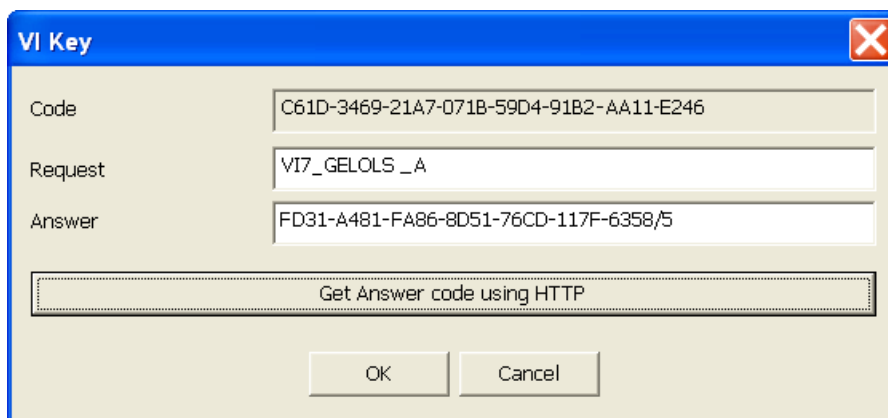


Fig. 4. Successful activation

5. To press button « OK » . Program **VibraImage7Lite** will be automatically started in selected version.

You will see your image with aura (like Fig 6), if web camera was connected to your PC.

You will see the white screen if there are no working video devices connected to PC. For start you need to put mouse point on the screen and press right mouse button. You will see short system menu like on Fig. 5.

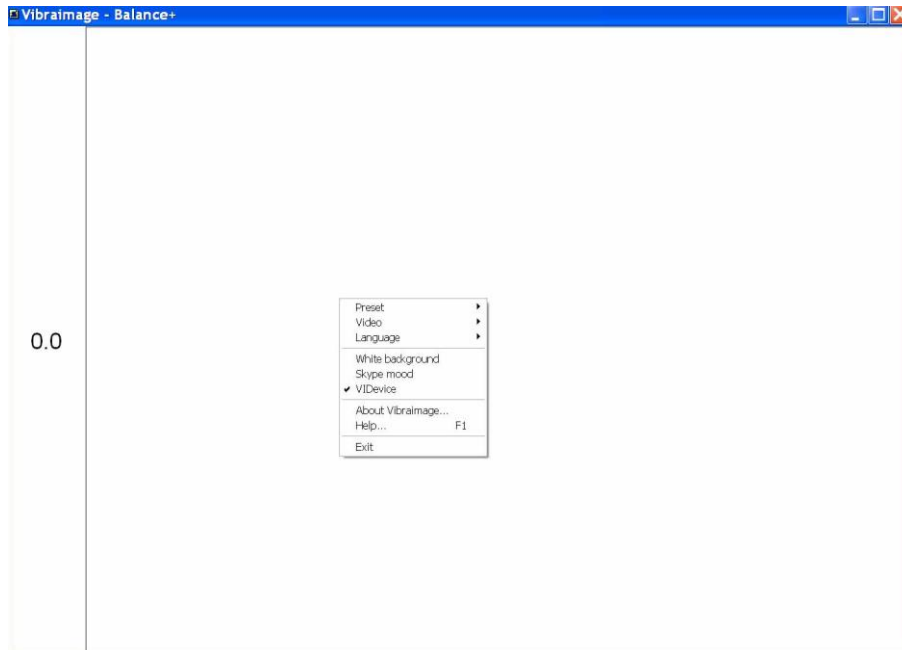


Fig. 5 Start menu

6. Start operation with system.

2.2. Reinstallation of **VibraLite** software

Note, the ability to reinstall chosen VibraLite modification on a new computer is given to user. 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 to the Internet a computer on which one of VibraLite programs has been installed,
2. Start VibraLite program for reinstallation on a new computer.
3. In a program window, having pressed the mouse right button, to cause the menu and to choose item « About Vibraimage ... »

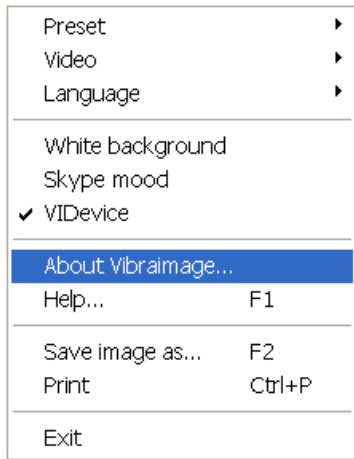


Fig. 6. Program menu.

4. In the opened window to press the button « Unregister key ».

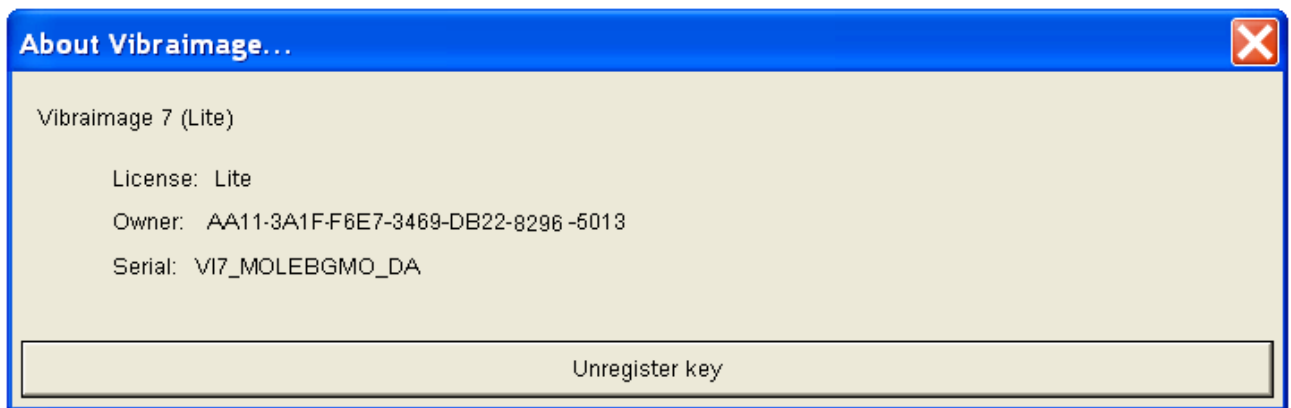


Fig. 7. About of program

5. Close the program.

6. Connect a new computer to Internet.

7. On a new computer to execute the chosen program modification installation and to make registration of a "old" modification activation key through the Internet, according to recommendations of section 2.1.

8. After successful program registration the given activation key will be fixed to the given computer.

3. **VibraLite**. User manual

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

VibraImage technology registers micromovement (vibration) of person by standard digital, web or television cameras and image processing. Human head microvibration is linked with the vestibular-emotional reflex (VER) http://en.wikipedia.org/wiki/Vestibulo_emotional_reflex of a person and reflects emotions levels. **VibraImage** system detects human emotions by the control of three dimension (3D) head-neck movements and fluctuations, accumulated in several frames.

After start of **VibraLite** program in the basic window there is an image from connected video device.

Detail description of vibraimage adjusting rules you could read from VibraImage PRO professional Manual from the link http://www.elsys.ru/downloads/VI7_3ManualEng.pdf

3.1. Main window

Main window (Fig. 8) consists of the following parts:

- image area (on right side);
- information window (on left side).

In an information column (at the left side on the screen) it is displayed, calculated by the program, values of person emotion level parameters. Note, the type of the displayed parameter depends on the running program.

Running program	Parameter
Compatibility VI	Information column indicates the compatibility level of two persons in frame.
Aggression VI	Information column indicates the person aggression (activity) level
Aura VI	Information column is not used
BioTester VI	In an information column is displayed the basic button for switch on/off basic work mode (Fig. 9)

Brain Voice VI	Information column is not used
Suspect VI	Information column indicates person suspect level
Stress VI	Information column indicates person stress level
Tension VI	Information column indicates person tension level
Balance VI	Information column indicates person balance level
Charming VI	Information column indicates person charm level
Energy VI	Information column indicates person energy level
VibraLie	Information column indicates person level of psychophysiological response and lie detection result (DI, NDI, INC).
E-Monster	Information column is not used. Facial image dimensions depend on personal emotions.

In heading of the basic window the following information is indicated:

- type of video source: Video camera or AVI file;
- model of video source: Video camera model or AVI file name;
- Name of running VibraImage module



Fig. 8. **VibraImageLite** main window of *Aggression+* modification

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.

3.2. Main menu

For a call of the program menu it is necessary to click in a working window the mouse right button. The appeared main menu will consist of the following items (Fig. 9):

- **Preset** – choice of the basic modes of display of the information: VI – vibraimage, AV – aura on vibraimage, AR – aura on real image, LD – lie detect mode.
- **Video** – adjustment of a videocamera parameters or loading of an external videofile.
- **Language** – Choice of language of the interface and help system.
- **White background** – white background using
- **Skype mood** – At teamwork of Skype and Vibraimage programs you can observe current psycho-emotion parameters of the interlocutor in Skype program window
- **VIDevice** – support virtual camera drivers;
- **About Vibraimage** - view the information about software version, license type and registered user name.
- **Help** – call the help system about full version VibraImage software.
- **Save image as** – save current picture to external graphics file
- **Print** – print current picture



Fig. 9. Main menu

In **BioTester** mode the appeared main menu will consist of the following additionally items (Fig. 10):

- **Start H 10s** – gathering of information is made for 10 seconds, and the window of frequency information viewing is showed automatically after 10 seconds
- **Frequency analysis results** - switching in a mode of frequency analysis graph display
- **BioTester Results** - to open a window with results of psycho-energy condition of the person testing

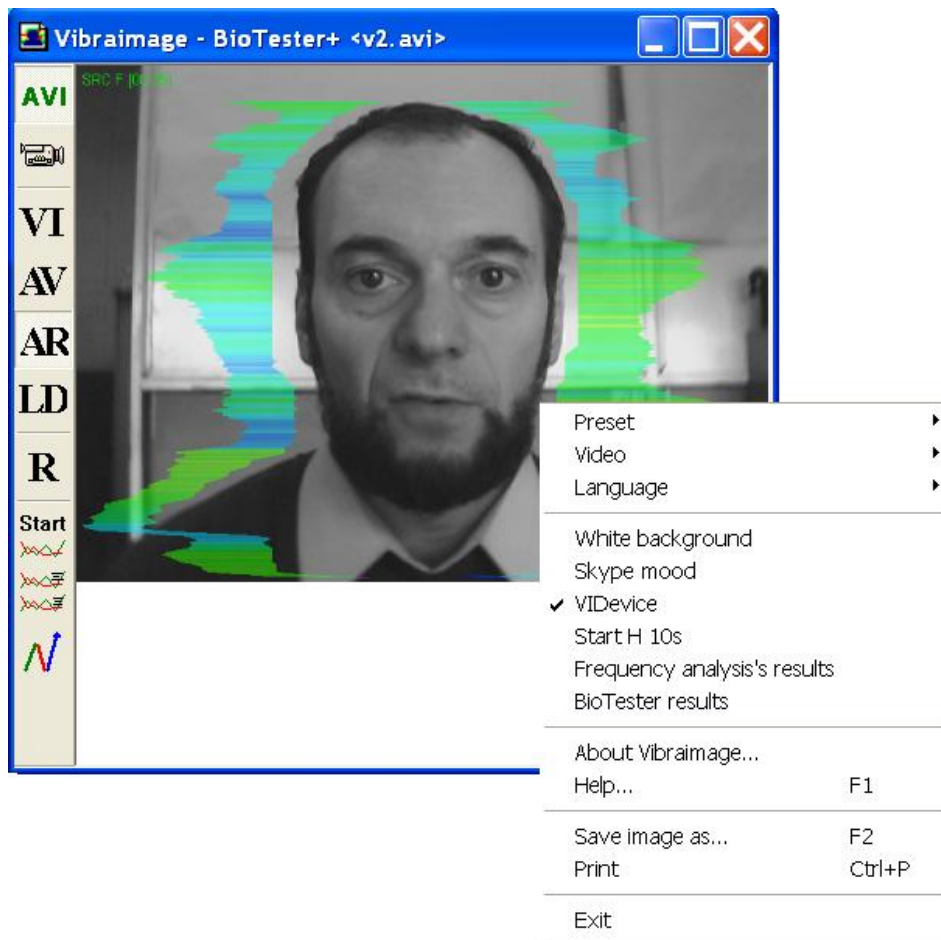


Fig. 10. Main menu in BioTester mode

Submenu «**Video**» contains options of video modes. Its can differ depending on connected devices. For example this menu contains the following items (Fig. 11). You can choose as video source one from many installing in PC video-devices or load external video file.

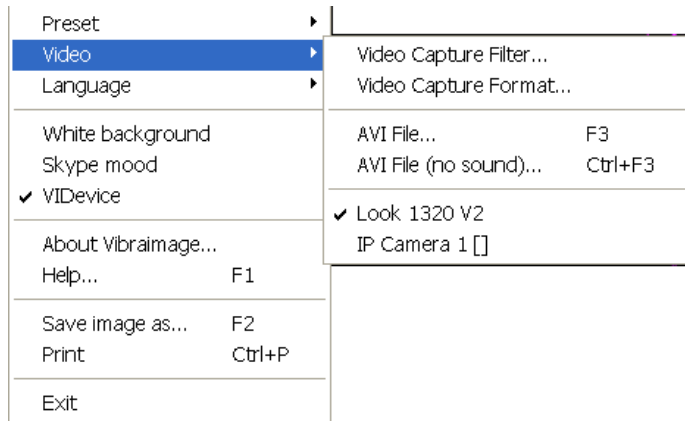


Fig.11. Submenu « Video»

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

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

VibraImage System allows to processing as the «alive» video signal acting from a videocamera, and the videodata, before written down and saved as a AVI-file. On default the system works with a signal from a videocamera. Subitems « **AVI File ... F3** » and « **AVI File (no sound) ... Ctrl+F3** » are intended for a choice for the analysis of an external videofile.

Mode «**File (no sound)...**» - use for load AVI files without audio support. This mode designed for work with **VibraSound** mode.

3.3. Image area control

Vibraimages, images and external vibraimages (auras) are displayed in the image area.

The **VibraImageLite** basic window can be configured for surveillance in several operating modes.

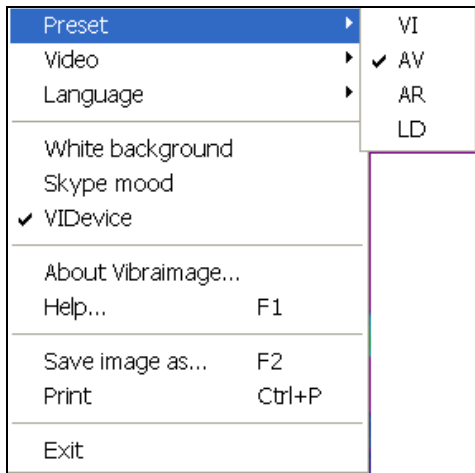


Fig. 12. Work mode select

Item «**Presets**» menu designed 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. 15). In VibraImageLite version color for every image pixel depends on its vibrations frequency.
- In «**AV**» mode [«Aura Vibraimage mode»] external vibraimage (aura) allocated around the internal vibraimage or simple vibraimage. Aura line size depends on medium line vibration amplitude. Aura line color depends on maximum line vibration frequency inside vibraimage contour (Fig. 13).
- In «**AR**» mode [«Aura on the Real image»] the aura of the person is shown around his real image (Fig. 14).
- In «**LD**» mode [«Lie Detector mode»] image area shows real object image.

Note, at a displayed of the image in VI and AV modes it is possible to change color of a background of the image, having chosen main menu item « White background ».

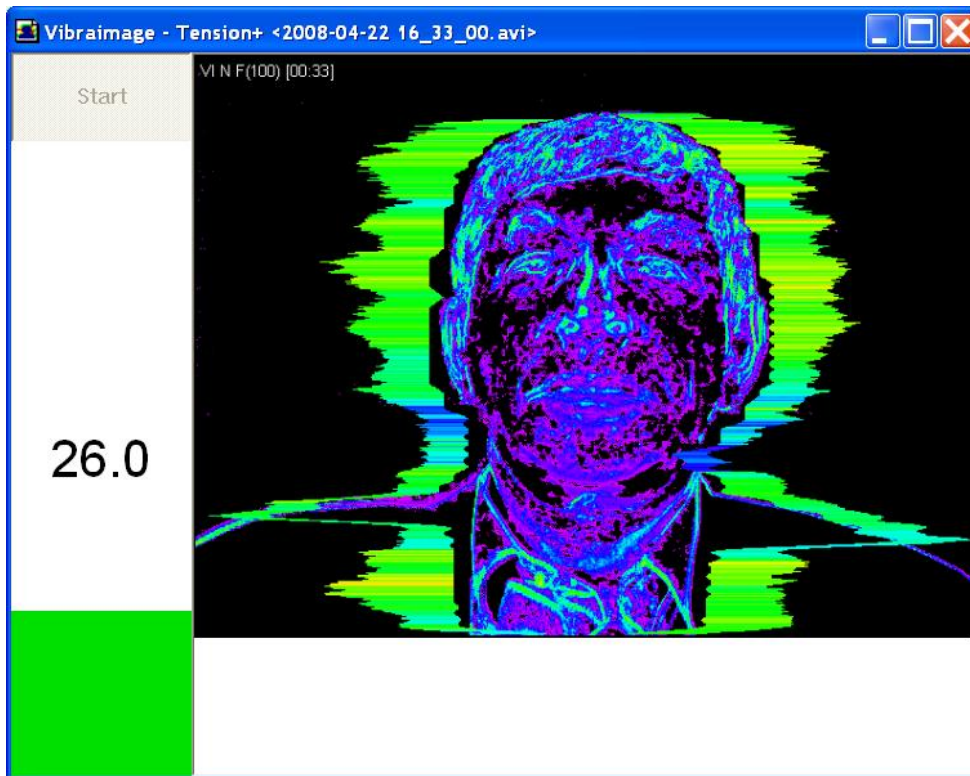


Fig. 13. AV mode on black background.



Fig. 14. AR mode.

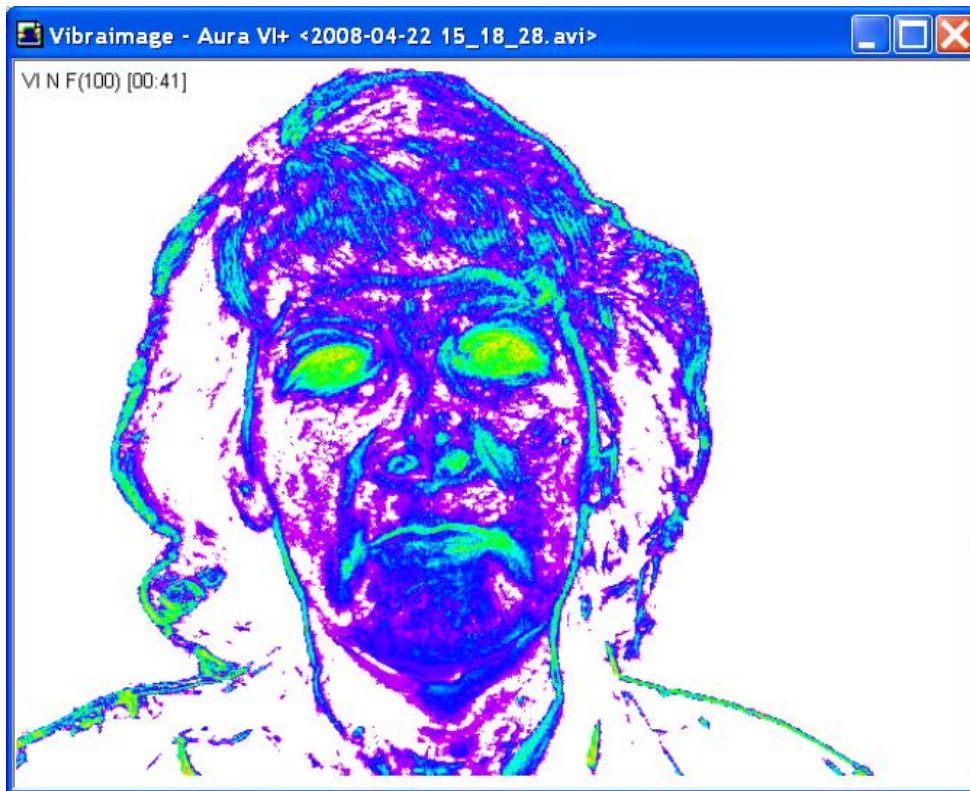


Fig. 15. VI mode on white background.

Note, in the left top corner of a image window the image processing mode (Fig. 16) and time from the beginning of viewing AVI file are showed.

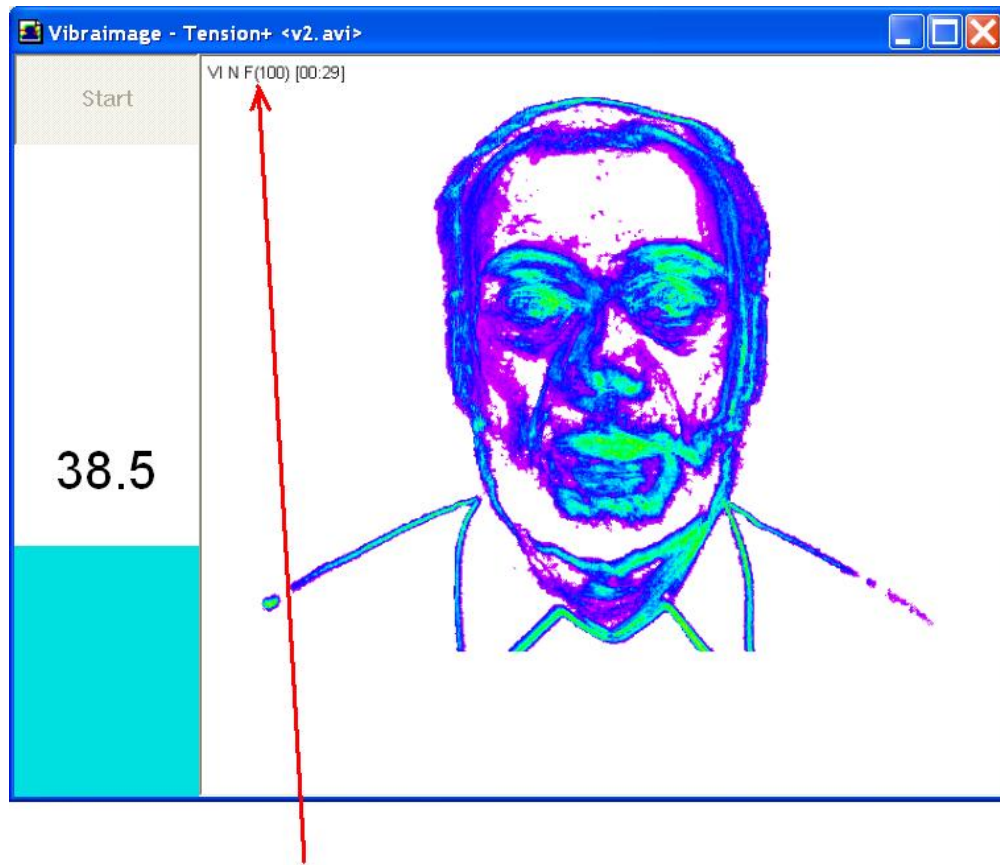


Fig. 16. Image example. Use VI mode with point frequency analysis(F) and average on $N=100$ frames.

3.4. Information accumulation mode

By default, at the left in an information column (Fig. 17) is displayed the current value of the chosen emotional parameter.

By pressing «**Start**» button accumulating information on the chosen parameter will start for 1 minute.

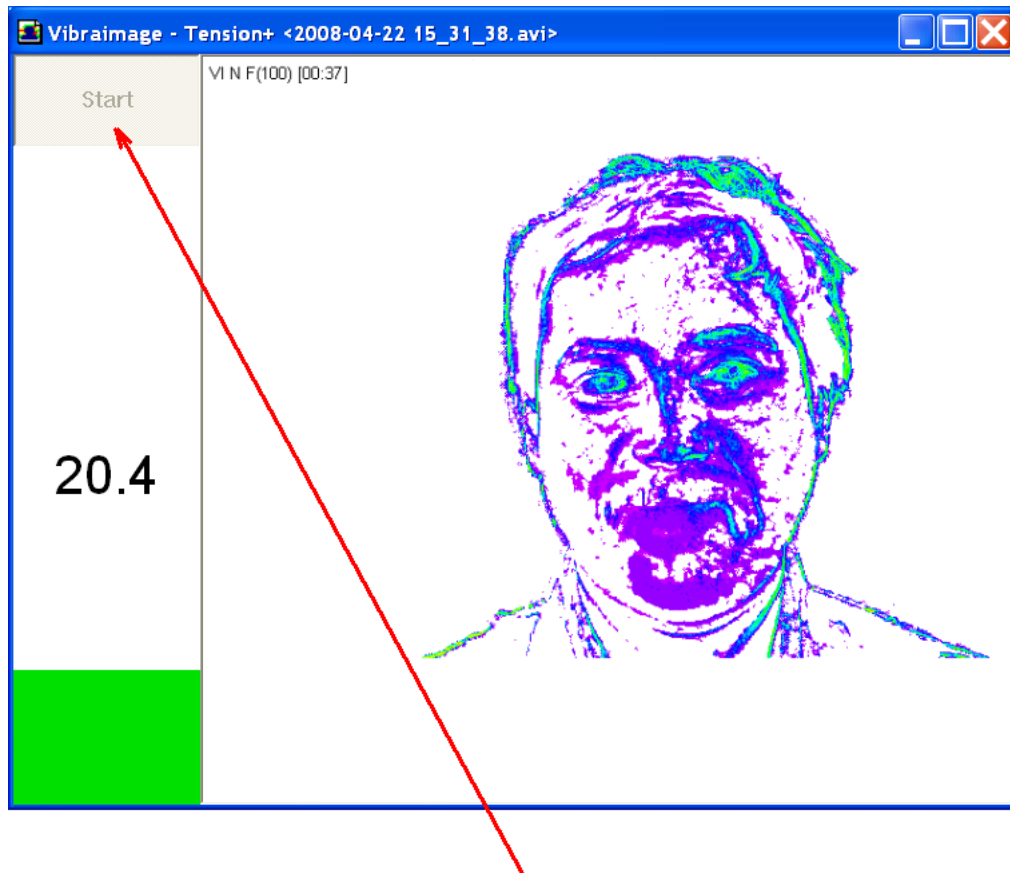


Fig. 17. In information columns displayed current parameter value.

After pressing «**Start**» button in an information column «sand-glass» with down counter will appear (Fig. 18). If thus to press «**Live**» button the system will return to a base operating mode with display of the current parameter value.

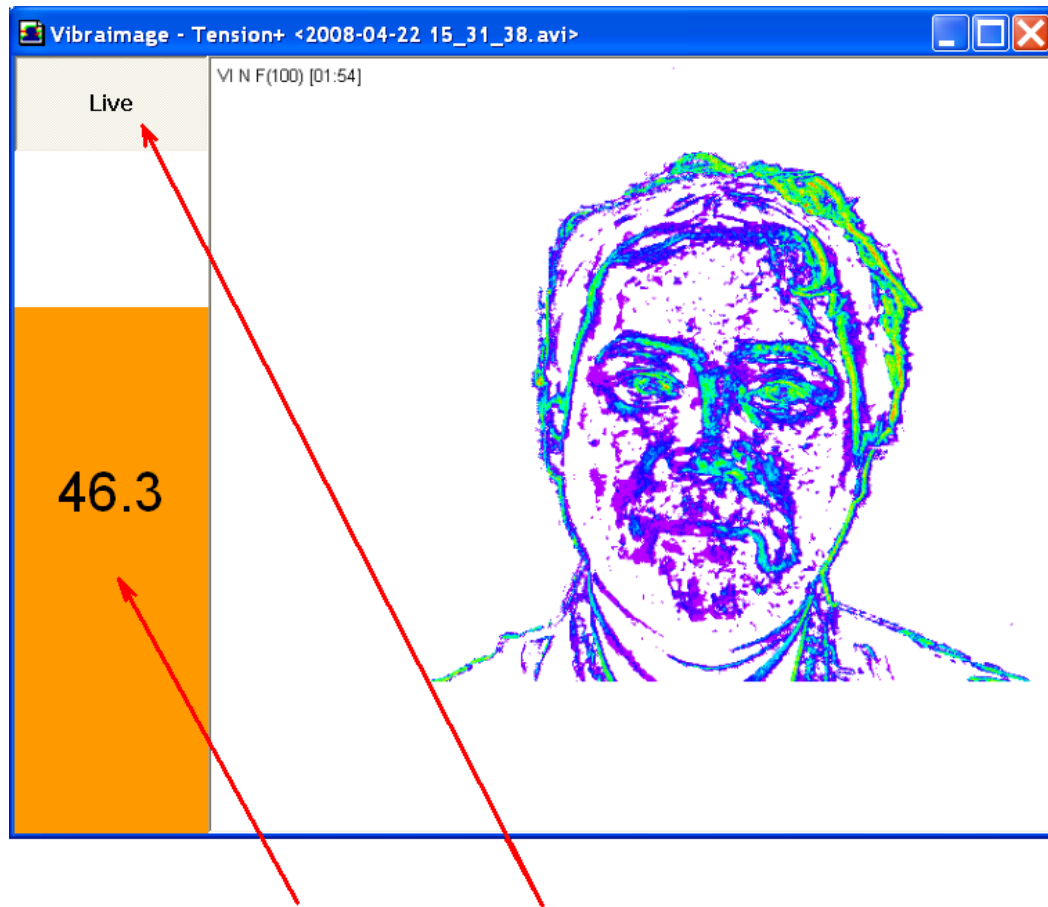


Fig. 18. In information columns displayed timer value

On the end of the information accumulating an information column the average value of parameter will be displayed (Fig. 19). By pressing «**Restart**» button the new 1 minute interval of the information accumulation about parameter will start.

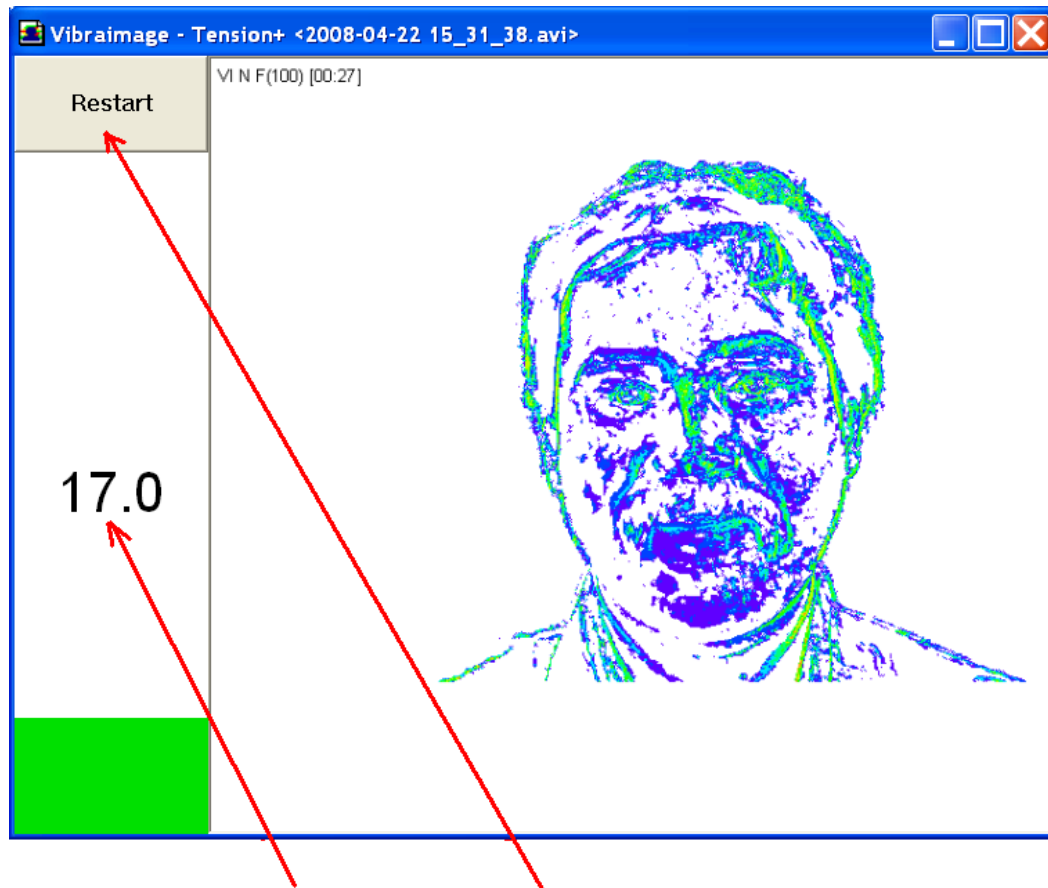


Fig. 19. In information columns displayed average parameter value.

3.5. BioTester software

The given program is intended for carrying out of testing of the person and animals condition before, after and during any external influences. The BioTester differs high sensitivity and instantly displays change of mental concentration and physical energy exchange of alive objects. The BioTester shows change of a psycho-energy condition of the patient at the weakest influences, for example, from radiation of mobile phone, influence of jewelry, amulets, biocorrector, physical and mental loading on the person. The BioTester information field fixes a condition of energy allocated by the person on a horizontal scale in dimension kcal/minute, and on a vertical scale in %, a condition of psychological concentration of the person. The given values physical parameters are calculated on statistical parameters of the person vibration frequency histograms which help the expert to characterize a condition of the person.

Note, the frequency analysis modes are accessible only to BioTester VI modification of VibraImageLite software (Fig. 20).

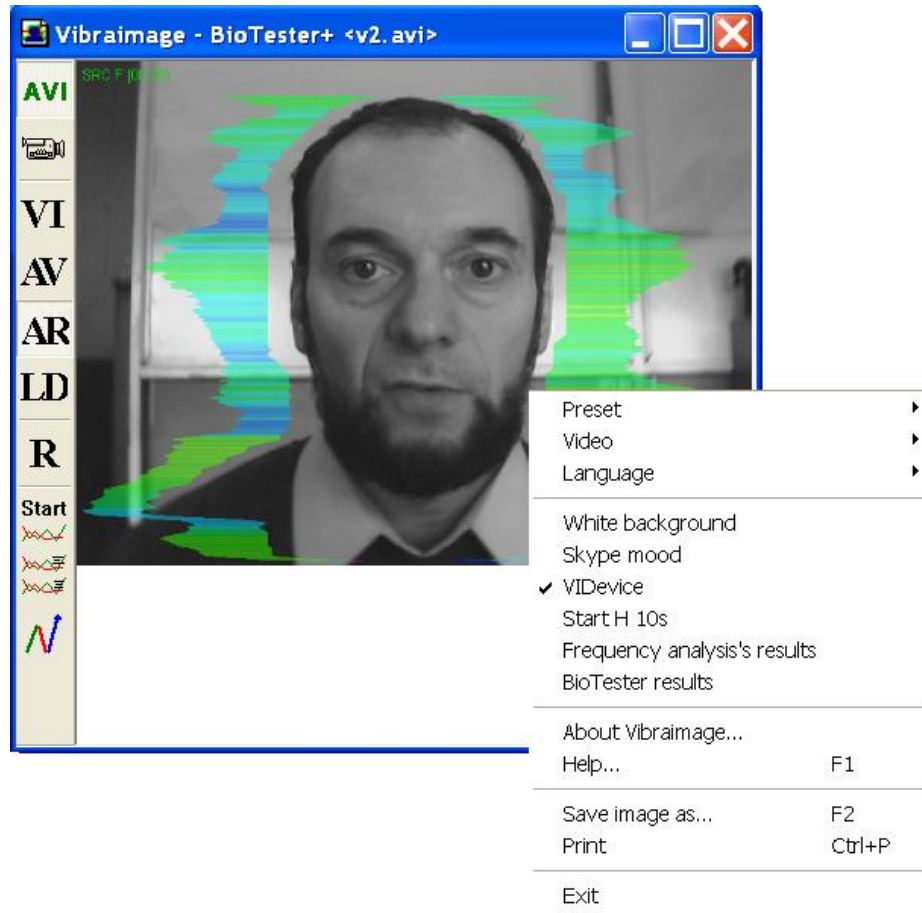





Fig. 20. BioTester mode

At a choice of item « **Start H 10s** » or pressing of the button  will be made information accumulation for 10 seconds, and the window with results of testing is showed automatically after 10 seconds (Fig. 21).

The user can be switched between windows with results of testing emotional conditions and windows with results of the frequency analysis. The mode of viewing of frequency analysis graph is switched on/off by the button  or a choice of menu item « Frequency analysis results ». And a mode of viewing of testing of the person condition results (Fig. 22) is switched on/off by the button  or a choice of menu item « BioTester results ».

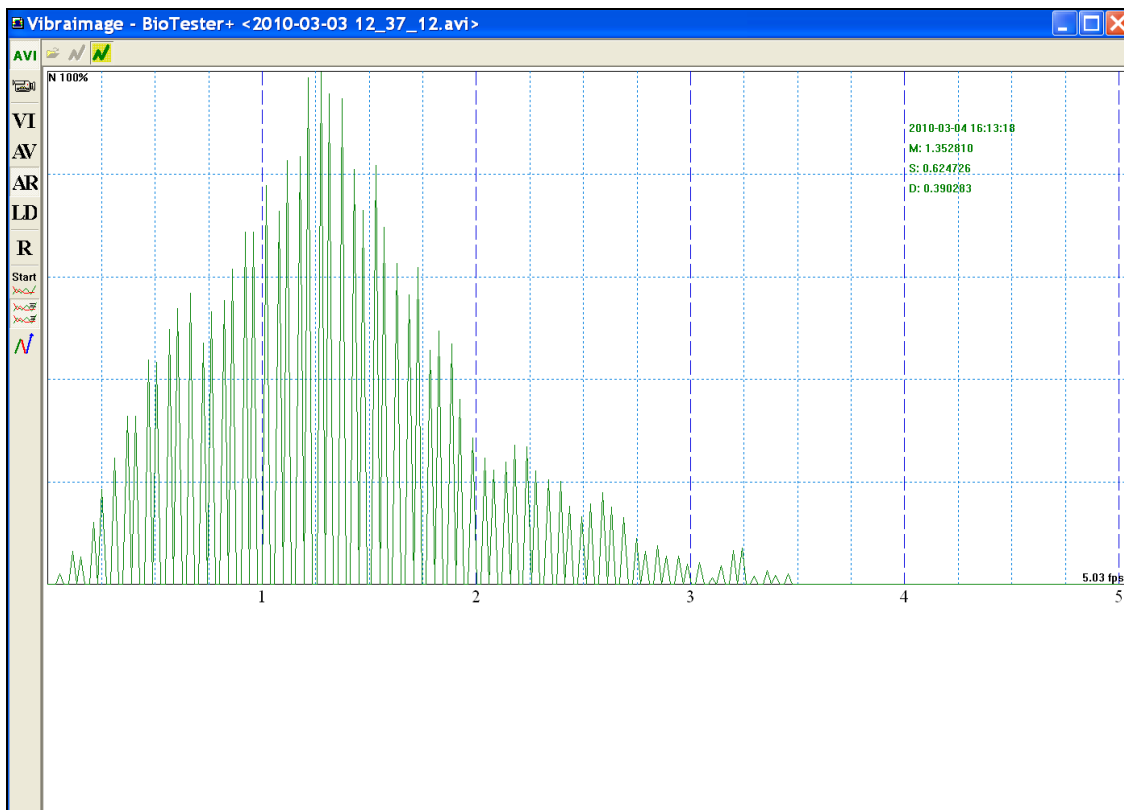


Fig. 21. Frequency analysis results

Each histogram is characterized by the following parameters:

- M - the center of weights of frequency distribution (average value of microvibrations frequency);
- S - root-mean-square deviation of frequency distribution;
- D - a dispersion of frequency distribution.

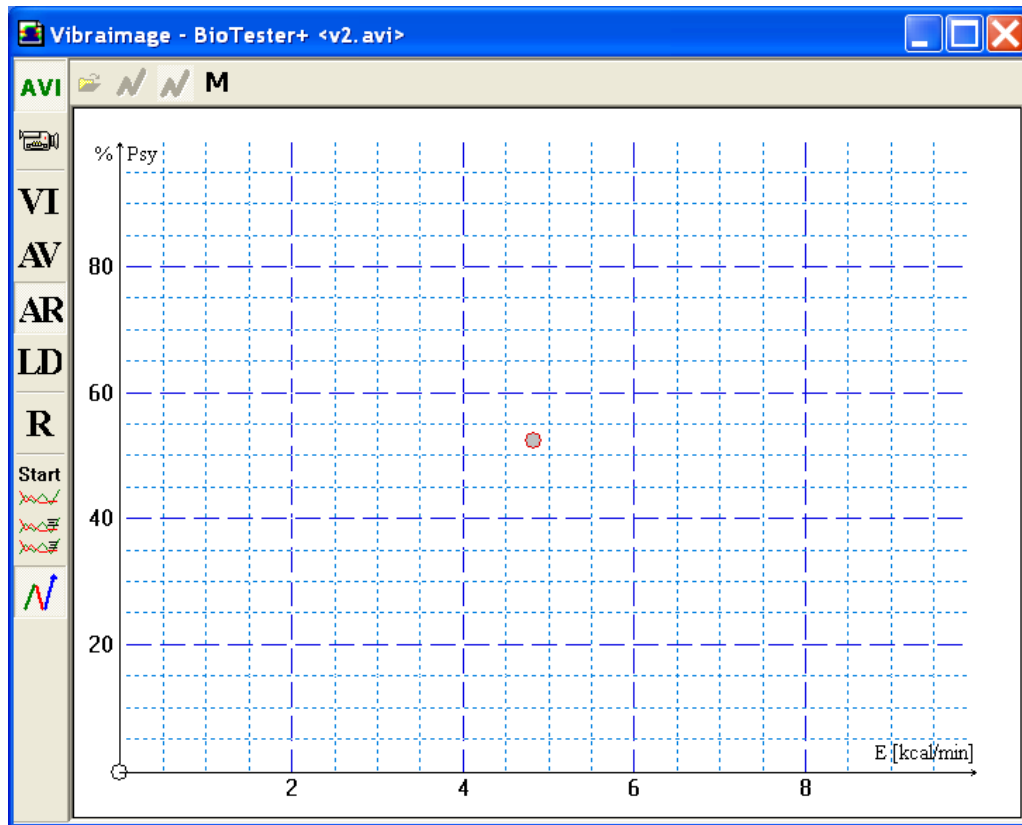



Fig. 22. BioTester results view mode

The point on the graph displays the current psycho-energy condition of the person. On axis Y the mental condition of the person is displayed in %, if it is more, than the condition is better. On axis X in a Kcal/minute energy of the person is displayed.

At repeated pressing of the  button or a choice of corresponding menu item, will be made new accumulation of the information and in graph area the following result of frequency distribution will be displayed (Fig. 23).

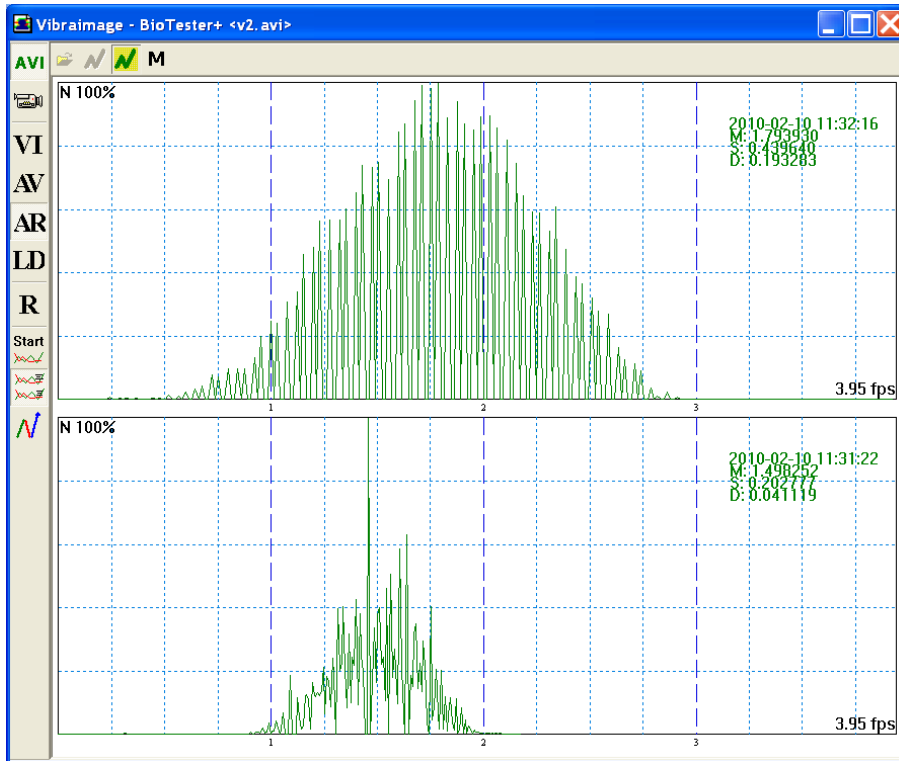


Fig. 23. Old and new frequency histograms

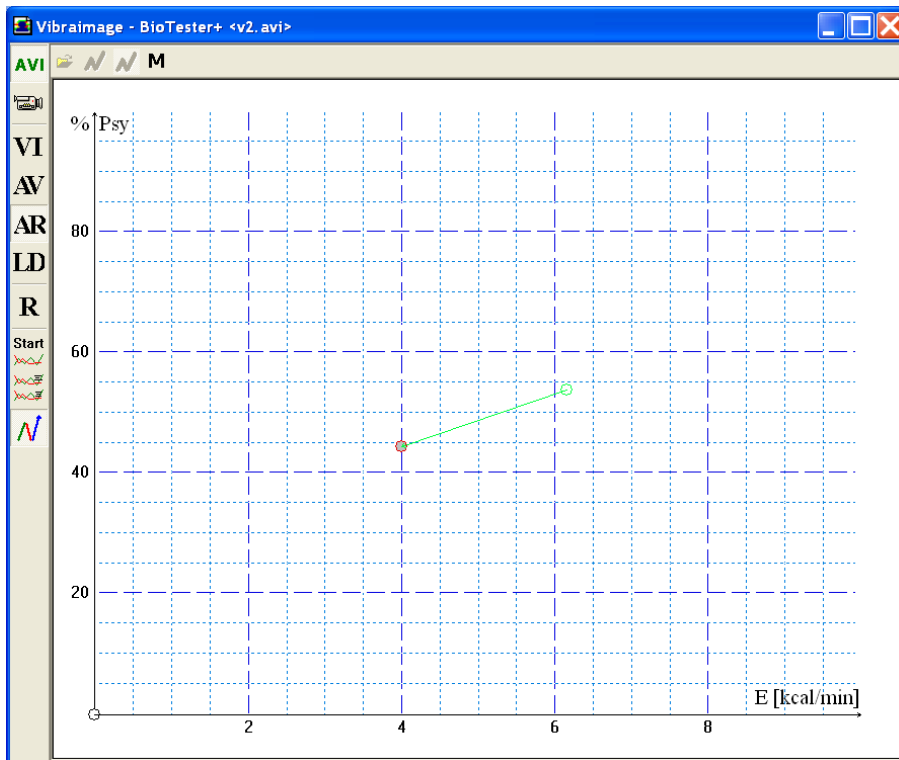



Fig. 24. Old and new human state.

The user also has an opportunity of viewing previously saved results of the frequency analysis. For this purpose it is necessary, to pass in a mode of viewing of the frequency histogram in the area of image, and then having pressed **button «Load»**  to load earlier saved data and to compare them with just received.

To remove the received graph of the frequency analysis it is necessary to bring the mouse pointer to the chosen diagram, to press the right mouse button and to choose item «**Delete**».

To save the received graph it is necessary to bring the mouse pointer to the chosen diagram, to press the right mouse button and to choose item «**Save as...**» (Fig. 25).

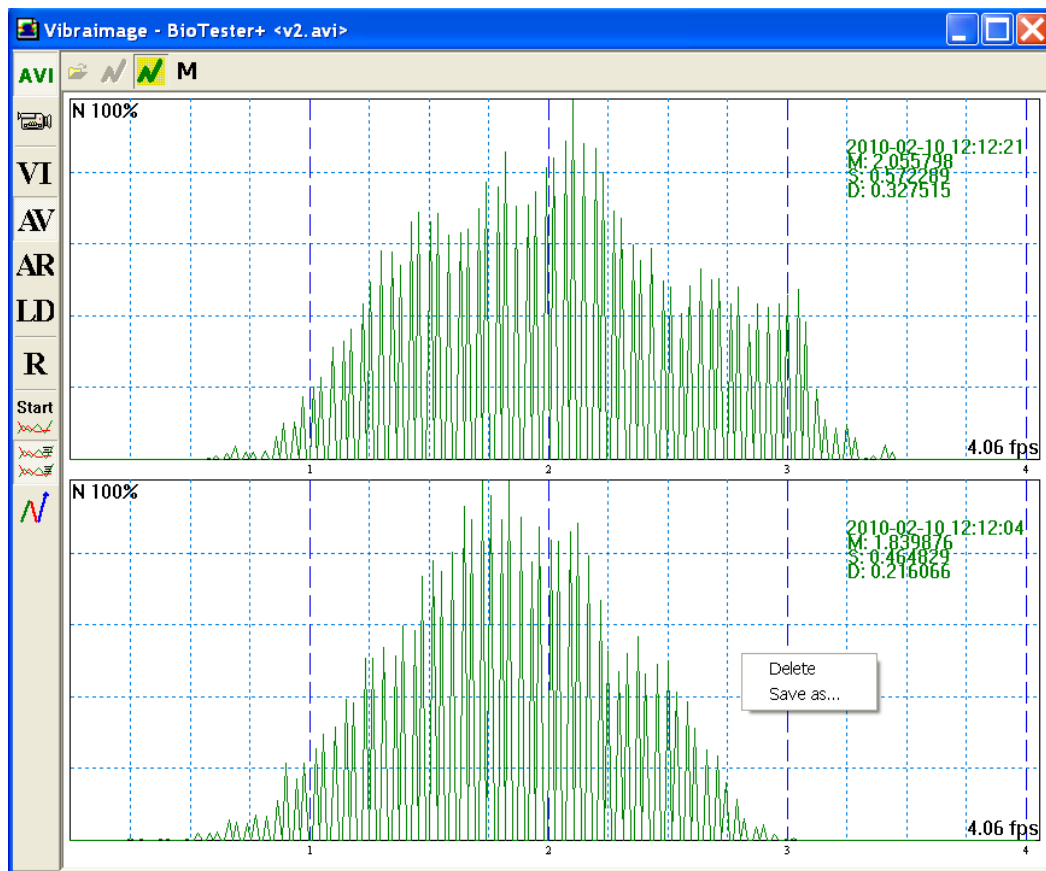


Fig. 25. Save and delete results

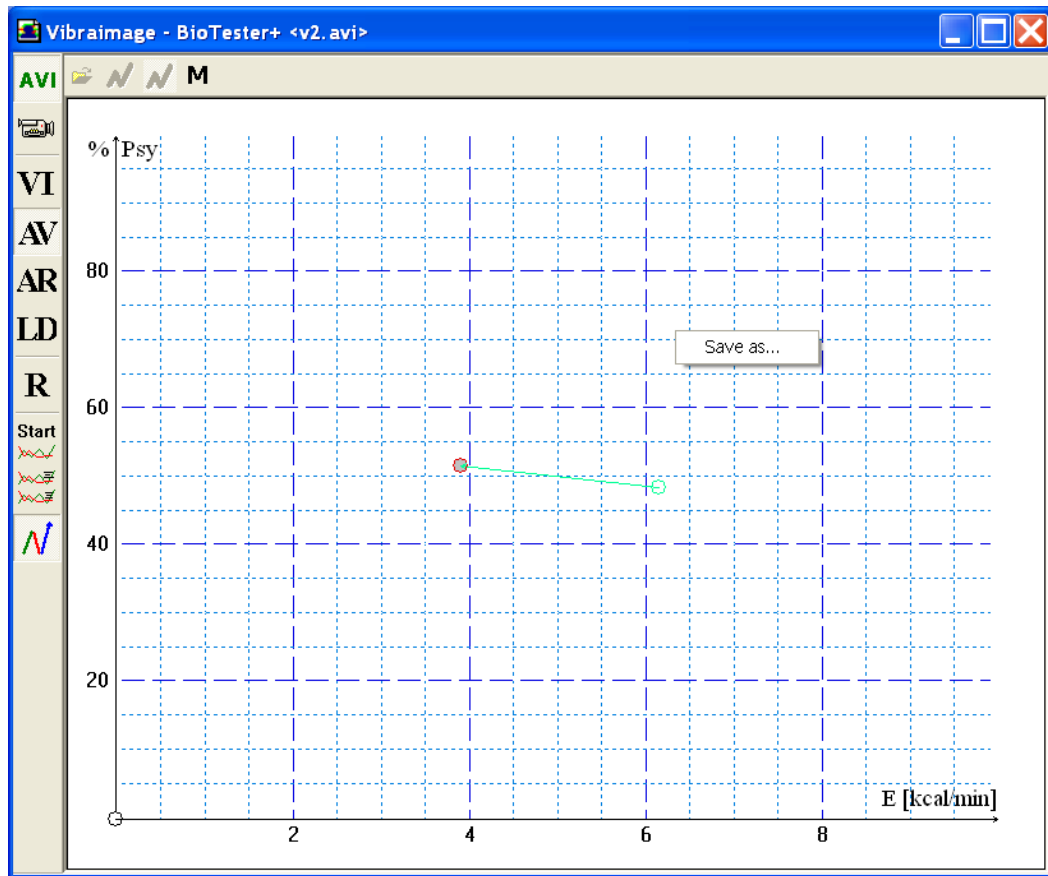


Fig. 26. Saving results

3.6. Brain Voice software

The program is intended for sound display of the person microvibrations, thus the color scale of aura vibrations frequency is replaced on sound signal frequency accessible to person hearing, i.e. standard micromovements with frequency of 0,1-10 Hz will proportionally be transformed to a standard sound signal with frequency from 100 up to 20000 Hz, and the amplitude of vibrations reflects capacity of a sound for each frequency.

The given mode allows to watch for behaviour of object, for example, when the visual control over the monitor is impossible or unprofitable over any reason. Also this program allows people with loss of sight to receive the full information about emotional condition of the interlocutor, at all not seeing him.

In many cases additional audio signal about a condition, ideas and emotions of the person can be more informative and is accessible, than visual supervision which too can take place.

Visually working window of the Brain Voice program little than differs from other programs of « lite version » vibraimage, but the constant going broadband sound signal, characterizes the smallest changes of movement and even idea of supervision object.

3.7. VibraLie program for psychophysiological detection of deception

VibraLie program intends for psychophysiological detection of deception of verbal and non-verbal lie in auto, auto-manual and manual modes. Program fixes and compares psychophysiological characteristics of person captured in different time period for standard examination methods. Every nowadays existing technical means of lie detection registers changes in different psychophysiological parameters of humans. Current opinion that significant changes in psychophysiological parameters happens when person is nervous, worry and lie. When person is still and calm his psychophysiological parameters are more stable in time, so if we compare known still time period with examinees question period, we determine is it lie or true. Different examination methods (Comparative Questions test (CQT), Guilty Knowledge Test (GKT), Concealed Information Test (CIT)) are constantly developed and improving, it is possible to read a lot of literature about it, for example (<http://en.wikipedia.org/wiki/Polygraph>). The modern technical lie detection is mostly based on Integrated Zone Comparison Technique (IZCT) was firstly suggested by Cleve Backster (http://en.wikipedia.org/wiki/Cleve_Backster). The comparison test principals are easy for everybody understanding and requests only comparing of responses to control and relevant questions, controlled by psychophysiological detector like VibraLie system.

The main window of VibraLie program indicated on Fig. 27

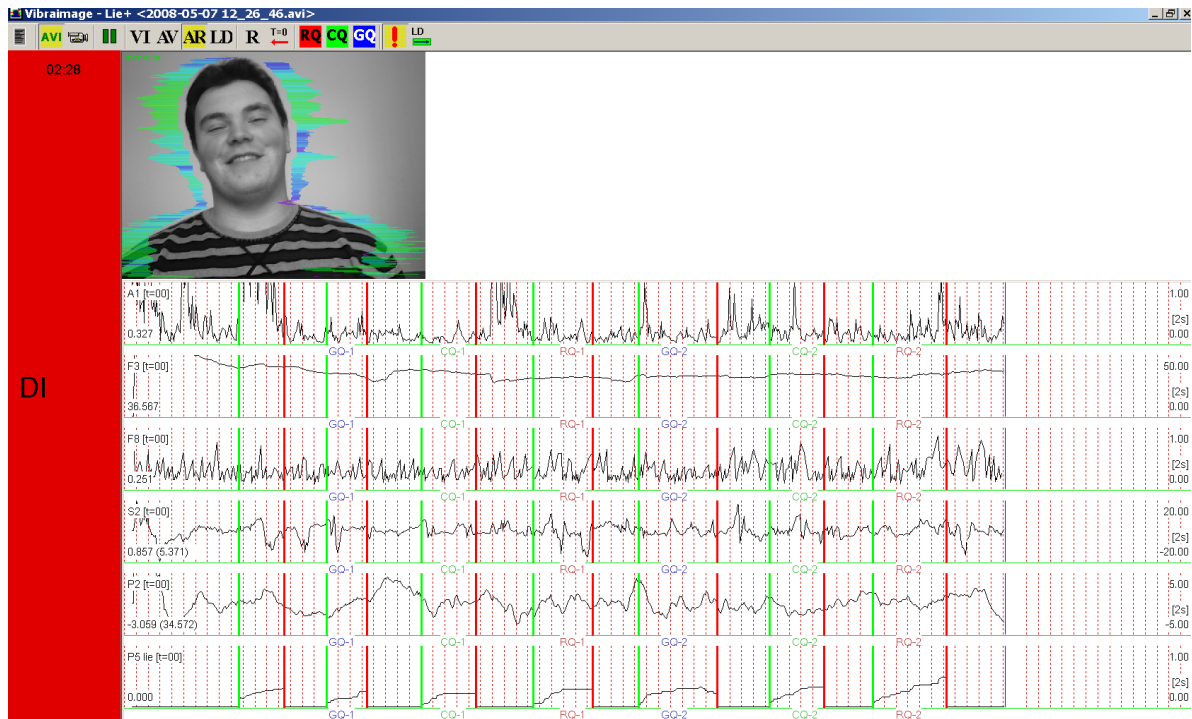


Fig. 27. The main window of VibraLie program with time dependence of psychophysiological parameters during the examination and indication of questions type and examination result

3.7.1 Main menu

VibraLie program main menu includes the following functions and options see Fig.28:

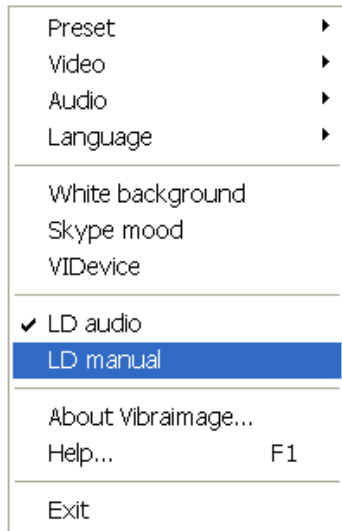


Fig. 28. Main menu of VibraLie.

Preset – choice of visualization mode from

- LD** – real video image;
- AR** – aura (external vibraimage) around real video image;
- AV** – aura around internal vibraimage;
- VI** – internal vibraimage;

Video – choice of video source, as recorded video files (avi), or live camera video;

Audio – choice of audio threshold of start LD detection and finish LD detection in LD audio mode;

Language – choice of menu language from English, Russian, Korean;

White background – choice of background color in VI mode;

Skype mood – stand mark for the operation in Skype;

VI device – stand mark for the transfer video to any standard video program, like AMCAP, from Microsoft;

LD audio – choice of audio mode for lie detection, where audio signal more than stand threshold used for start lie detection analyzing time period;

LD manual – choice of manual mode for lie detection, where time period for lie detection selected by pressing LD button on the Tools panel;

About Vibraimage – user code information;

Help – help information about Vibraimage program;

Exit – program exit

3.7.2 Tools panel of VibraLie program

Tools panel of VibraLie program shown on Fig 29.



Fig. 29. Tools panel of VibraLie program.

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

- main menu choice;
- avi files download for PDD analysis;
- live video camera connection;
- pause on image and program operations;
- choice of internal vibraimage mode;
- choice of aura-vibraimage mode;
- choice of aura to real image mode;
- choice of standard television mode;
- reset parameters and graphs to 0;
- restart avi file from the beginning, graphs reset;
- mark of relevant questions on graphs and LD calculation results;
- mark of control questions on graphs and LD calculation results;
- mark of general questions on graphs;
- indication of PDD results as DI, NDI, INC;
- start/stop of psychophysiological response analyzing time period in manual mode.

3.7.3. Psychophysiological detection of deception in LD audio mode

In LD audio mode user needs firstly to adjust Audio Threshold so that background audio level must be lower than Audio Threshold and audio level of questions and answers must be higher than Audio Threshold. In this case every question-answer response divided by time period not less than 10 seconds from the next question-answer response is characterized by level of changes for every measured psychophysiological parameter. The total changes in psychophysiological parameters are characterized by two general indicators – P5 integral parameter indicated on the down graph, and P20 differential parameter indicated on the vertical column. More quantity of P20 parameter after response indicates more high level of psychophysiological response and gives more lie probability for two response comparison.

Sample of program window for PDD is shown on Fig. 30



Fig. 30. Program VibraLie window of PDD sample in Audio mode.

It is necessary to note, that calculations of integral response P5 and differential response P20 are doing based on the more quantity of psychophysiological parameters than is indicated on the Fig. 30. In the base of LD calculation algorithm are using the same equations as in professional Vibraimage version including calculation of time dependence changes about 30

psychophysiological vibraimage parameters. The results of comparative testing between traditional contact polygraph and vibraimage PDD shows 95% matching.

For psychophysiological changes visualization in VibraLie are using the indication of the following vibraimage parameters:

A1 - value of base processing frame difference amplitude, indicated fast head movement of person;

F3 – average value of pixel quantity, change for time period of 100 frames processing, shows general level of head movements and emotional energy for current 20 seconds period;

F8 – peak value of F6 parameter (in seconds) shows current period of F1 parameter changes, indicated minimal time of person response;

S2 – average difference between left and right accumulated movement response of object for 10 second, show movement and minds asymmetry;

P2 – dispersion of vibraimage frequency distribution for 100 processing frames, indicated dispersion of head movement in time and space;

P5 – integral indicator of psychophysiological response, calculated with equal rates for every fixed vibraimage parameters;

P20 – quantitative indicator of psychophysiological response, calculated with different rates for the fixed vibraimage parameters, because for vibration process some part of psychophysiological parameters are accelerated and other part are inhibited during the one psychophysiological response.

In auto mode examiner need to control left vertical column, because maximal level in this column (P20), shows maximum psychophysiological response and could be interpretive as lie.

3.7.4. Psychophysiological detection of deception in manual-auto mode

Principals of comparative testing and averaging for responses of question-answer zones, coined in the 60th years of XX century by Cleve Backster (<http://www.backster.net/images/accuracy.pdf>), gave requested high accuracy for psychophysiological detection of deception and have done lie detector the reliable instrument in expert hands. The comparative zones are based on the fixed structure of question-answer testing, including general, comparative and relevant questions in one test. So fixed test structure allows combine analyzing of response to several similar questions, so it is possible to calculate average response to several control questions and separately calculates average response to several relevant questions. This testing structure gives more accuracy for any measurement, so it is acceptable also for lie detection, too. Standard lie detection test structure includes 9-14 questions, one of this questions relevant (most important) is presented by several times (during one test), because was proved that during one test is correct to present the only one relevant question. Several relevant questions in one test give more errors, because examinee could concentrate only on one question during the test.

Let's consider the test structure on the simple actual test sample: You are interesting where your partner was at night, when he tells that was working in office. In this case the question «Really, were you in the office last night» is relevant question and the main important question of this test.

All test must includes several questions for replying one meaning answers as Yes or No, like the suggested sample:

1. Did you have breakfast yesterday, as usual?
2. Was the cold weather on the morning street?
3. Did you tell lie to your friends?
4. Did you work in office this night?
5. Let's go to cinema this weekend?
6. Did you ever tell lie to me or my family?
7. Really you were in office this night?
8. Did you take your purse from home at this morning?
9. Did you steal something before?
10. Is it true, that you were working this night?

General (Blue) questions (GQ) have diverted meaning and have not influence to calculation result, but they are necessary for reducing concentration attention of examinee on the relevant questions. Response to the control question (CQ) is very important to the test calculation, control question usually asked about past criminals, which are happened in everybody life. The verbal answer on control question is not so important (Yes or No), more important is psychophysiological response corresponding to this reply. If quantitative average response to control questions is more than analogical quantitative average response to the relevant questions (RQ), that means person tells true. If quantitative average response to relevant questions (RQ) is more than analogical quantitative average response to the control questions (CQ), that means person tells lie. This results are based on experience of several dozen years of psychophysiological detection of deception.

Sample of psychophysiological responses for comparative zones test to control and relevant questions captured by VibraLie system is shown on Fig. 31.



Fig. 31. VibraLie window for comparative zones test of PDD.

Examiner or operator marks control questions (CQ) and relevant questions (RQ) pressing on corresponding buttons on the Tools panel of VibraLie window. After test finishing operator or examiner (person asking questions) press button **!** on the same Tools panel. VibraLie program immediately shows test result on the vertical column. The true test shows green column with NDI (Non Deception Indication), the lie test shows red column with DI (Deception Indication), if it is impossible to do precise calculation of lie detection, program shows yellow column with INC (INConclusive result).

3.7.5. Psychophysiological detection of deception in LD manual mode

Lie detection in manual mode used when question-answer audio quality (live or recorded) is poor for correct mark of questions start and it is impossible to divide questions-answers from background audio. In this case is necessary to switch program into LD manual mode as it is shown on the Fig. 32.

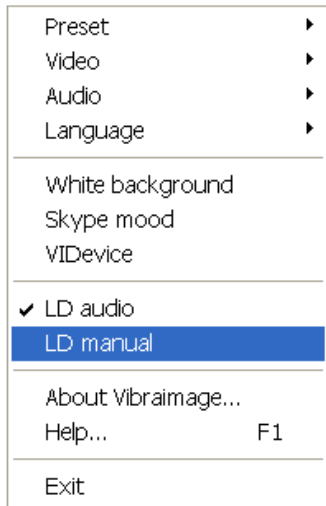


Fig. 32. Choice of LD manual mode

In LD manual mode also is possible lie detection based on comparison test zone, and in this case operator or examiner mark the start of control question zone and finish of control question zone, so as for relevant question zones pressing button LD on the Tools panel of VibraLie window.

3.7.6. Contactless lie detection application based on VibraLie system and vibraimage method

In spite of complicated processing algorithms VibraLie system is very simple and friendly for users and could do lie detection so mass technology like personal computer application. Though psychophysiological lie detector appears before personal computer, lie detectors did not receive so mass application, firstly because using of contact sensors which are not friendly for privacy. First computers also were not using for personal application, it were great boxes used only in big companies, and term personal computer was joke and nonsense for a long time. Traditional polygraph with contact sensors comparative to vibraimage looks like old computer vs modern computers. Technical progress is constant and it is difficult to accept the conclusion of several polygraph specialists that the only method for psychophysiological detection of deception is contact, and you need to measure only skin-galvanic response, pulse, respiration and blood pressure. Really for screening psychophysiological state of person needs to capture uncorrelated psychophysiological data, however high quality digital television signal gives greatly more independent psychophysiological information about person based on vestibulo-emotional reflex (VER) http://en.wikipedia.org/wiki/Vestibulo_emotional_reflex than limited number of contact sensors from traditional polygraphs.

NOTE

- 1. It is necessary to take in account that correct PDD results are base on right vibraimage conditions described in this manual. Less illumination, noisy camera and slowly computer could give a lot of errors to the result.**
- 2. VibraLie system used only for private using. VibraLie program results are not accepted by the court and could not be used as juridical evidence. The results captured by VibraImage PRO system could be accepted to the court.**
- 3. Remember that lie is natural function of evolution process, everybody are lying in some conditions. VibraLie system gives you more possibilities for lie detection, please, use this possibilities according to common sense and based on the laws of your country.**
- 4. Please, note, that suggested PDD examination method shows VibraLie system possibilities, but not limited it. Users could apply VibraLie system according to their aims and methods.**

3.8. E- Monster

Program shows facial image of person changed by emotions. You could detect monsters by this program even if person is hidden emotions under the mask of normal face. This program allows to see monsters around you!

Webcam looks on the person and transforms the facial images depends on emotional state like it is shown on the Fig 33.



Fig. 33. Facial dimensions transformed by E-Monster program images based on emotional analysis

Any changes from normal status of aggression, stress, anxiety, threat, balance, charming, energy and self regulation could transform human to monster. More changes of emotions give more changes from human to monster. When person emotions are normal the program image is identical to standard video image. It is very funny to look how person image is changed by emotions in such magic mirror.

4. Definition of emotions

Head movements in space classically associated with vestibular system are studied and discussed in relation to the status of vestibular reflexes (i.e., the vestibulo-ocular, vestibulo-collic, and cervico-ocular reflexes). But it is possible to look on head movements according to the vibraimage system and technology. We supposed that head balance for person without consciously movements could be considered as isolated thermodynamic system and any emission of internal energy would change the balance of this isolated system and realized by movements or vibrations. Every emotional state characterized by specific energy conversation and work done by the system transfers to micro vibrations, if the person forced to stand or seet still. The head vibration parameters (frequency in range 0,1-10 Hz and amplitude) are stable in time for stable emotional state of person. Parameters of vibrations changed only after emotional state alteration. VibraImage technolgy allows to contactless register of person vibration parameters and calculates emotions according to accomulated statistics of comparative testing with EEG, skin galvanic reaction and psychological testing. VibraImage technics, parameters and research results are below.

4.1. VibraImage parameters

Values of amplitude and frequency of vibrations of a person head differ in each point of space and are displayed as pseudo color image. Integrated processing of parameters values of vibration in each point can give the general information on parameters of the person movement. Vibraimage the person heads displaying amplitude (see Fig. 34) and frequency (see Fig. 35) the distributions of vibrations modulated by a color scale (see Fig. 36), are resulted below:

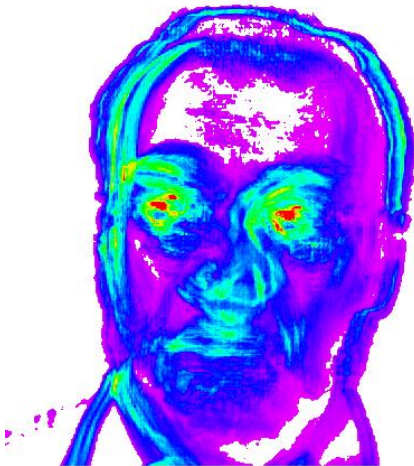


Fig.34. Amplitude vibraimage

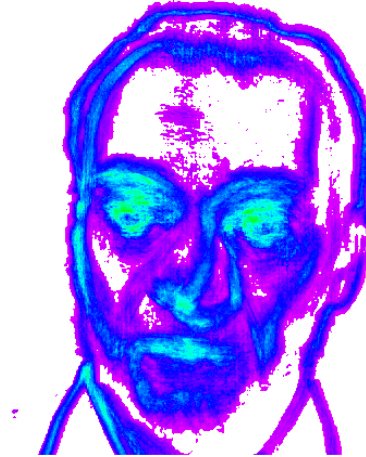


Fig. 35. Frequency vibraimage

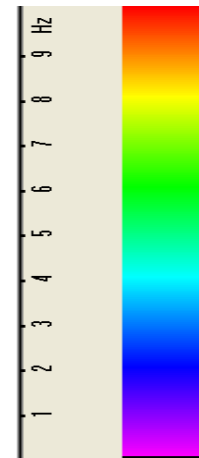


Fig. 36. Pseudo color scale of frequency distributions

Each point (pixel) amplitude vibraimage (Fig. 34) reflects the relative moving of an element of the image saved up for determined time as it is known, that at insignificant movings the frames difference is proportional to the movement of object. For transformation of this relative moving in absolute, it is necessary to have the exact information on distance up to object and a working corner of an objective of the chamber, then a color scale (see Fig. 36) can be scaled in millimeters or microns.

As against amplitude analyses, each point frequency vibraimage has physical dimension frequencies (Hz) as really displays frequency of signal change in each element of the image. Therefore the resulted color scale (see Fig. 36) scaling in Hz, i.e. violet color frequency vibraimage displays a range of vibrations (0-1) Hz, dark blue displays a range of vibrations (1-4) Hz, green the range of vibrations displays (4-8) Hz, red displays a range of vibrations (8-10) Hz.

On the basis of the given two primary images the technique assumes definition more than 40 integrated vibraimage parameters, reflecting various types of movement and vibration, and the parameters divided into 4 basic groups:

- A – amplitude parameters;
- F – frequency parameters;
- S – symmetry parameters;
- P – spatial and timing parameters of mathematic calculation.

4.2. Aura-VibraImage

External (around of a head) interline display of the maximal frequency and average amplitude vibraimage looks as aura and more informatively displays a condition of the person, than internal vibraimage. Color of aura is coded by the same color scale, as vibraimage (Fig. 37), and displays the maximal frequency in each line. The size of aura is defined by average amplitude for the given line. Any non-uniformity in color and the size of aura characterizes movements of object and its emotion condition. The normal condition of the person is characterized more uniform external vibraimage (aura), and for an intense condition of the person are characteristic the big space and color non-uniformity of aura.



Fig. 37. External vibraimage (aura) of person in normal condition

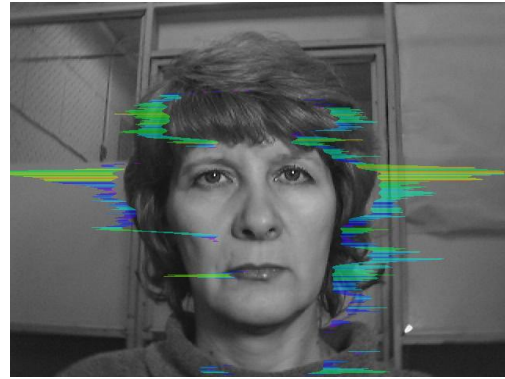


Fig. 38. External vibraimage (aura) of person in tension condition

Obvious distinctions between images on Fig. 37 and Fig. 38 illustrate advantages of the visual analysis of the person condition on external aura in comparison with the visual analysis initial vibraimage. The vibraimage method gives significant freedom of a choice of registration of a condition, and visual supervision of aura allows to estimate quickly and evidently practically all emotion parameters of the person. Brief interpretation of the form and color of aura is resulted below. This brief information does not limit, and sets to the user of system the basic directions of the analysis of person condition. Getting experience and taking into account the specificity of application, each user of system can diversify and deepen essentially results of the analysis of aura, open secret secrets of soul and a body of the person.

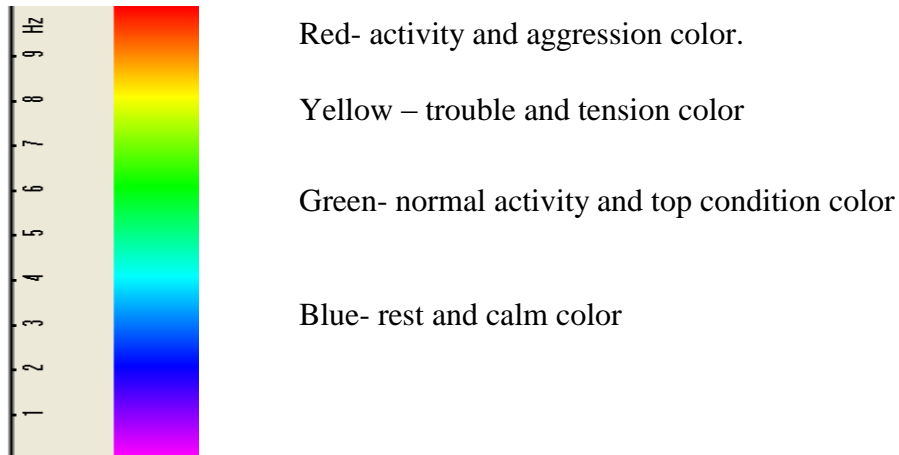


Fig. 39. Brief aura color interpretation.

Brief aura form analysis

- Any aura asymmetry (form, color) characterized deviation from mental or physiological norms.
- Any breaks in aura uniformity characterized deviation from mental or physiological norms.
- Ideal aura has mono color, symmetrical and uniform. Any real aura differs from ideal and the question of interpretation is to characterized real aura deviations.

Note

This brief aura 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.

4.3. Samples of human aura visualization

Normal and top emotional state

Normal condition characterized by aura color and form uniformity around the head, relevant monochrome color in the middle of suggested color scale. Activity level is about 0,3–0,6. Stress level is about 0,2 – 0,5. Tension level is not more than 0,4. Every emotion level measured in the range from 0 till 1,0 and minimal value coordinates with minimal emotion intensity.

Frequency distribution histogram is near normal (Gauss) distribution and spectrum of high speed vibraimage signals is near exponential distribution.

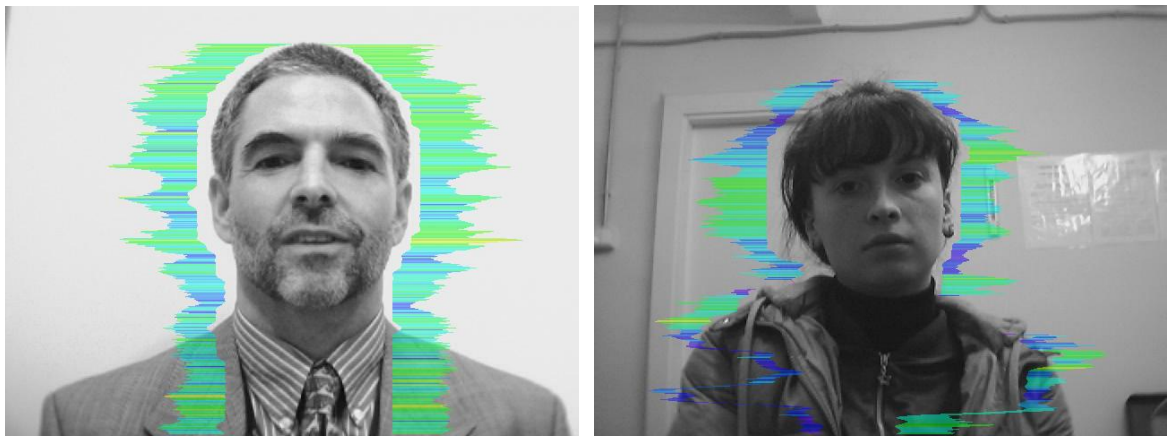


Fig. 40. Aura photos samples for normal condition of persons.

Stress state

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 41). 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.

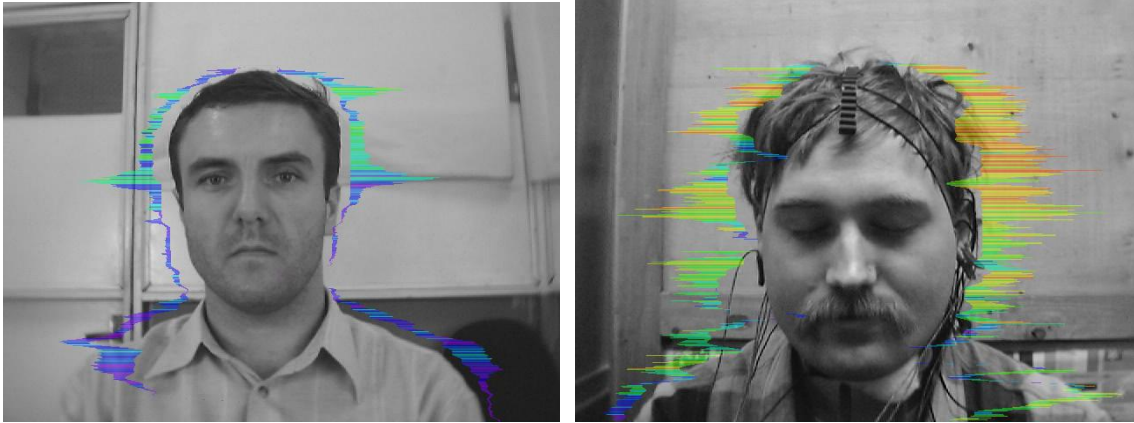


Fig. 41. Aura photos samples for stress condition of person.

Aggressive and/or tension state

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 42). 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.

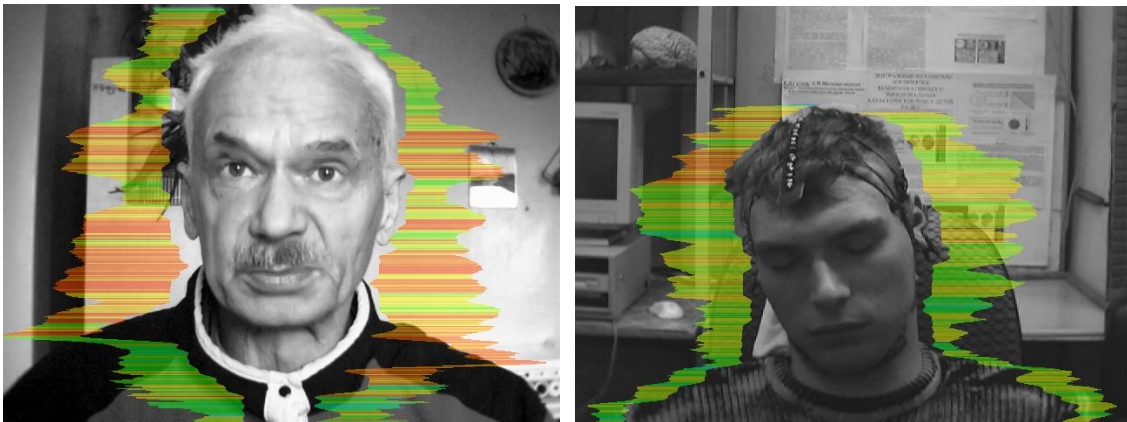


Fig. 42. Aura photos samples for aggression condition of persons.

Meditation

VibraImage system application allows to register distinction not only between the aggressive (abnormally excited) and normal condition of the client, but also and to register a degree of condition change of the person when the person calms down (see Fig. 43) or meditates.

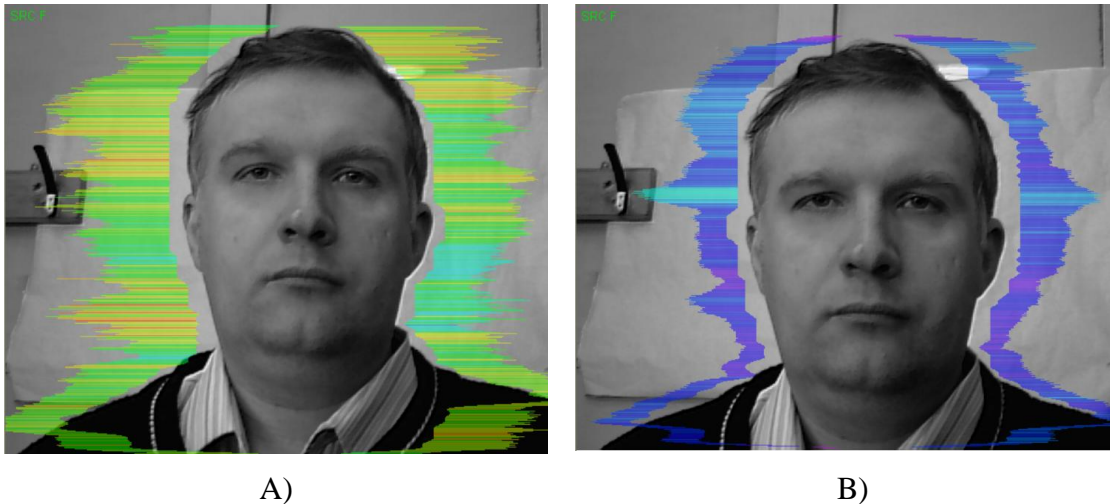


Fig. 43. Samples of self-correction person emotional states. A - 10 seconds after the beginning of supervision. B - 100 seconds after (the person have asked to calm down and count up to 100).

People compatibility

VibraImage system application allows to register people compatibility on the basis of their vibraimage analysis (see Fig. 44). For reception of a correct estimation of compatibility it is necessary to carry out the rules necessary for reception qualitative vibraimage:

- Two persons sit down beside as it is possible closely more to each other.
- Web camera is stand opposite and adjusted so that on the computer screen the image of two persons completely entered in the screen of a computer was visible.
- The distance from each person up to lateral screen side should be identical and make approximately 10 % from width of the monitor screen.
- Light exposure of pair should be sufficient and uniform.
- Persons should be inverted to the camera and not concern each other.
- Any other physical contact of pair, (embraces, pressings and other) only is welcomed and are raised measurement accuracy.
- The background should be uniform and it is desirable contrast concerning pair.



Fig. 44. Correct position of people pair

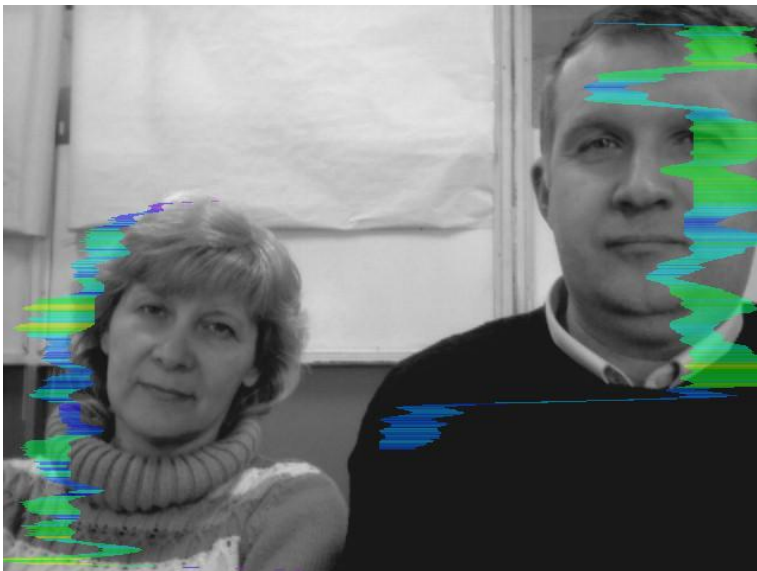


Fig. 45. Wrong position of people at check of their compatibility. People are on different distance from the camera and far apart.

Compatibility Estimation

Ideal compatibility of pair is characterized completely by symmetric aura. Any asymmetry of aura, characterizes the certain problems in compatibility, the more asymmetry, the it is more than problems in compatibility.

To the maximal compatibility there correspond the following aura parameters:

1. The symmetric form of aura from both sides of the researched pair
2. Symmetric painting aura from both sides of the researched pair

5. Warranty

5.1. Disclaimer of Warranties

You expressly acknowledge and agree that, to the extent permitted by applicable law, use of the Vibraimage software and services is at your sole risk and that the entire risk as to satisfactory quality, performance, accuracy and effort is with you. To the maximum extent permitted by applicable law, the Vibraimage software and services performed by the Vibraimage software are provided «as is» and «as available», with all faults and without warranty of any kind, and Elsys and Elsys' licensors (collectively referred to as «Elsys») for the purposes of sections 7 and 8) hereby disclaim all warranties and conditions with respect to the Vibraimage software and services, either express, implied or statutory, including, but not limited to, the implied warranties and/or conditions of merchantability, satisfactory quality, fitness for a particular purpose, accuracy, quiet enjoyment, and non-infringement of third party rights. Elsys does not warrant against interference with your enjoyment of the Vibraimage software and services, that the functions contained in or services performed by the Vibraimage software will meet your requirements, that the operation of the Vibraimage software and services will be uninterrupted or error-free, that any service will continue to be made available, that defects in the Vibraimage software or services will be corrected, or that the Vibraimage software will be compatible or work with any third party software, applications or third party services. Installation of this software may affect the usability of third party software, applications or third party services. You further acknowledge that the Vibraimage software and services are not intended or suitable for use in situations or environments where the failure or time delays of, or errors or inaccuracies in, the content, data or information provided by the Vibraimage software or services could lead to death, personal injury, 1 or severe physical or environmental damage, including without limitation the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, life support or weapons systems. No oral or written information or advice given by Elsys or an Elsys authorized representative shall create a warranty. Should the Vibraimage software or services prove defective, you assume the entire cost of all necessary servicing, repair or correction. Some jurisdictions do not allow the exclusion of implied warranties or limitations on applicable statutory rights of a consumer, so the above exclusion and limitations may not apply to you.

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