

# Psychophysiological profiling system

Software

## Manual

Version VibraMI

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Saint-Petersburg

2016

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## 1 Introduction

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

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

**VibraMI** is based on [multiple intelligences theory](#) of [Howard Gardner](#). Author of multiple intelligences concept offers an alternative approach to the general intelligence as measured by classical IQ-tests. Gardner's multiple intelligences are equal and independent of each other. Each of the basic intelligences is a special way of interacting with the environment, it is a person's ability to solve problems or to put new problems valuable under this or several cultures. In recent decades, the credibility of intelligence tests that measure total IQ has been steadily falling. Researches in different areas show, that IQ in points reflects only «actual development zone» - that is what a person knows at present time, instead of «zone of proximal development» ([according L.S. Vygotsky, 1982](#)) – ability to learn, acquire knowledge in a specific field.

Many researches were against the use of the term «intelligence» to describe some of the skills. They prefer to define «Musical-rhythmic and harmonic» and «Bodily-kinesthetic» intelligences as «talent». However, such a narrow definition according to Gardner devalue these skills in the sense that the conductors and dancers are talented, but not smart. The advantage of Gardner's theory of multiple intelligences is its flexibility and limitlessness of available human possibilities for self-realization in a professional field. In this regard Gardner speaks of «infinity» intelligences, their integrality and the ability to develop. In this program **VibraMI** complemented and expanded to 12 types of multiple intelligences classification version, indicating the possibility for self-realization in a specific professional field is presented:

1. **Intrapersonal (IA)**
2. **Existential-Theoretical (ET)**
3. **Logical-Mathematical (LM)**
4. **Business-Mercenary (BM)**
5. **Visual-Spatial (VS)**
6. **Naturalistic (NL)**
7. **Musical-rhythmic (MR)**
8. **Bodily-kinesthetic (BK)**
9. **Ascetic-Sacrificial(AS)**
10. **Verbal-linguistic (VL)**
11. **Bohemian-Demonstrative (BD)**
12. **Interpersonal (IE)**

## 1.1 Basic applications

**VibraMI** is designed to determine the non-cognitive abilities or personality characteristics during a psychophysiological testing.

Psychophysiological profiling system **VibraMI** software solves the following tasks:

- determination of the maximum human abilities area for its professional activities;
- recruiting and professional orientation test;
- profiling and disclosure of the personal characteristics;
- research and measurement of psychophysiological and emotional states of a person;
- research and ranking of psychophysiological responses to presented stimulus.

The software and the hardware form a **VibraMI** system.

Program **VibraMI** offers two basic questionnaire designed to determine the abilities of the person according to multiple intelligences model.

Gardner12Eng questionnaire is intended to identify the maximum human abilities in a stressful situation. Using this questionnaire system detects human abilities and fields of education, training and skills.

Gardner12SEng questionnaire is intended to identify the maximum human abilities in a pleasant situation. Using this questionnaire system detects human abilities in hobby.

## 1.2 Specifications

To correct work of the program, the user must have the hardware with the following parameters:

### 1.2.1. Basic parameters

- |   |     |
|---|-----|
| • Resolution, TVL, more than                | 400 |
| • Noise level of vibraimage, bit, less than | 0,1 |
| • Frame speed, FPS, more than               | 30  |

### 1.2.2. Digital (web) camera requirements

- |                                 |                      |
|---------------------------------|----------------------|
| • Resolution, pixel., more than | 640 x 480            |
| • USB compatible                | USB 3.0, USB 2.0.    |
| • Frame speed, FPS, more than   | 30                   |
| • Microphone                    | external             |
| • Exposition control            | automatic 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 Professional 7/8/10 with DirectX 9.0 or later
- Processor Intel I3 or later
- RAM more than 1024 Mb
- HDD more than 10 Gb
- USB port 1 free USB ports version USB 2.0
- DVD-ROM DVDRW
- Installed software 1 DirectX 9.0 or later
- Installed software 2 Windows Microsoft.NET Framework 1.1 or later
- Installed software 3 Microsoft Office Excel
- Video capture WDM-compatible video device

### 1.3. Package contents

- |    |                               |   |   |
|----|-------------------------------|---|---|
| 1. | VibraMI software              | - | 1 |
| 2. | Activation code               | - | 1 |
| 3. | User's manual                 | - | 1 |
| 4. | Digital USB camera (hardware) | - | 1 |
| 5. | Microphone (hardware)         | - | 1 |
| 6. | Personal computer (hardware)  | - | 1 |

#### Attention!

Hardware with the specified parameters isn't included in the delivery. User gets the hardware for the **VibraMI** system themselves.

It is recommended to use Microsoft LifeCam Cinema webcam or similar with parameters not worse than this webcam.

## 2. **VibraMI** software installation

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

1. Go to Web page <http://www.psymaker.com/ru/support/downloads/>
2. Load file [www.psymaker.com/downloads/VibraMI.exe](http://www.psymaker.com/downloads/VibraMI.exe)
3. Run file VibraimageMI.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. Press button «Install» at the start of installation.
10. Press button «Finish» at the end of installation.
11. **VibraMI** program icon appears after the end of installation in system menu on desktop of your computer.
12. To reboot a computer.

### 2.1 **VibraMI** software activation

1. Procedure of activation is made once at the first start of the program.
2. Before the program activation it is need to buy this version of the program in the online store Psymaker  
<http://www.psymaker.com/store/>
  - Activation procedure requests access to the Internet for receiving answer code from server.
  - Activation code has the structure shown in the table.

Key type	Software modification
VI8_XXXXXXXX_MI	<b>VibraMI</b> is software for psychophysiological profiling and definition of person maximum abilities in its conscious and unconscious psychophysiological responses to presented stimuli.

#### 2.1.1 Standard activation

1. For the activation beginning it is necessary to run the **VibraMI** program.
2. At the first start of the program the activation window will be displayed (fig. 2.1).

*Fig. 2.1. Activation window.*

3. In the field «Request» it is necessary to enter the activation code received by e-mail or specified by the seller (fig.2.2).

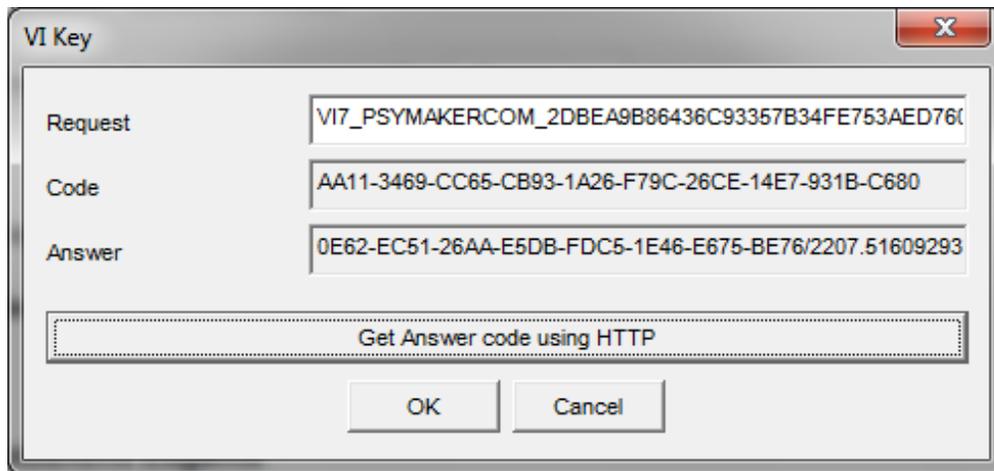
*Fig. 2.2. Putting activation code.*

4. After input of activation code to press the button «Get Answer code using HTTP».

**Attention!**

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

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

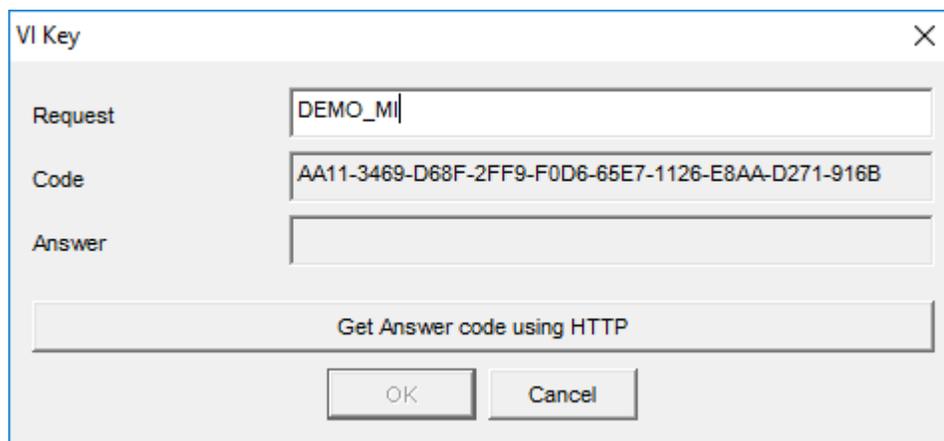


*Fig. 2.3. Successful activation.*

6. Press button «OK». **VibraMI** will be automatically started.

### 2.1.2 DEMO activation

1. For the activation beginning it is necessary to run the **VibraMI** program.
2. At the first start of the program the activation window will be displayed (fig. 2.1).
3. In the field «Request» it is necessary to enter «DEMO\_MI» (fig.2.4). After input of activation code to press the button «Get Answer code using HTTP».

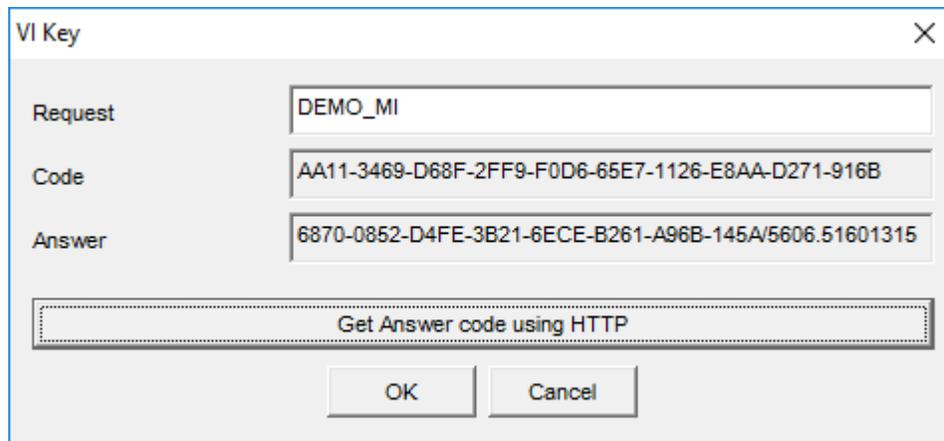


*Fig. 2.4. Putting DEMO activation code.*

#### **Attention!**

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

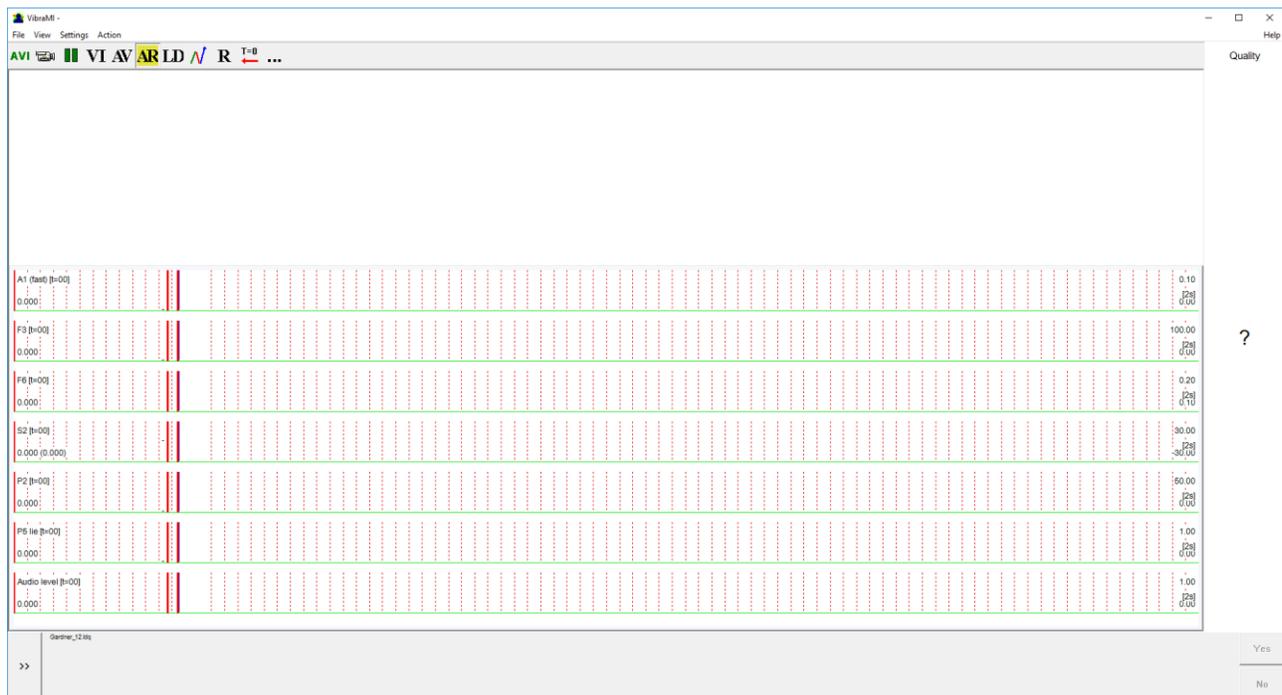
4. The activation code will be checked up through the Internet and, in case of successful end of activation procedure, the answer code will be sent (fig. 2.5).



*Fig. 2.5. Successful DEMO activation.*

5. Press button «OK». **VibraMI** will be automatically started in selected version.

After starting program you will see white screen (fig. 2.6). For camera selection in program it is necessary to click the right mouse button and to select the camera from the appeared submenu «Video» in menu «Settings» (fig. 2.7).



*Fig. 2.6. The first start of the program. The camera isn't connected.*

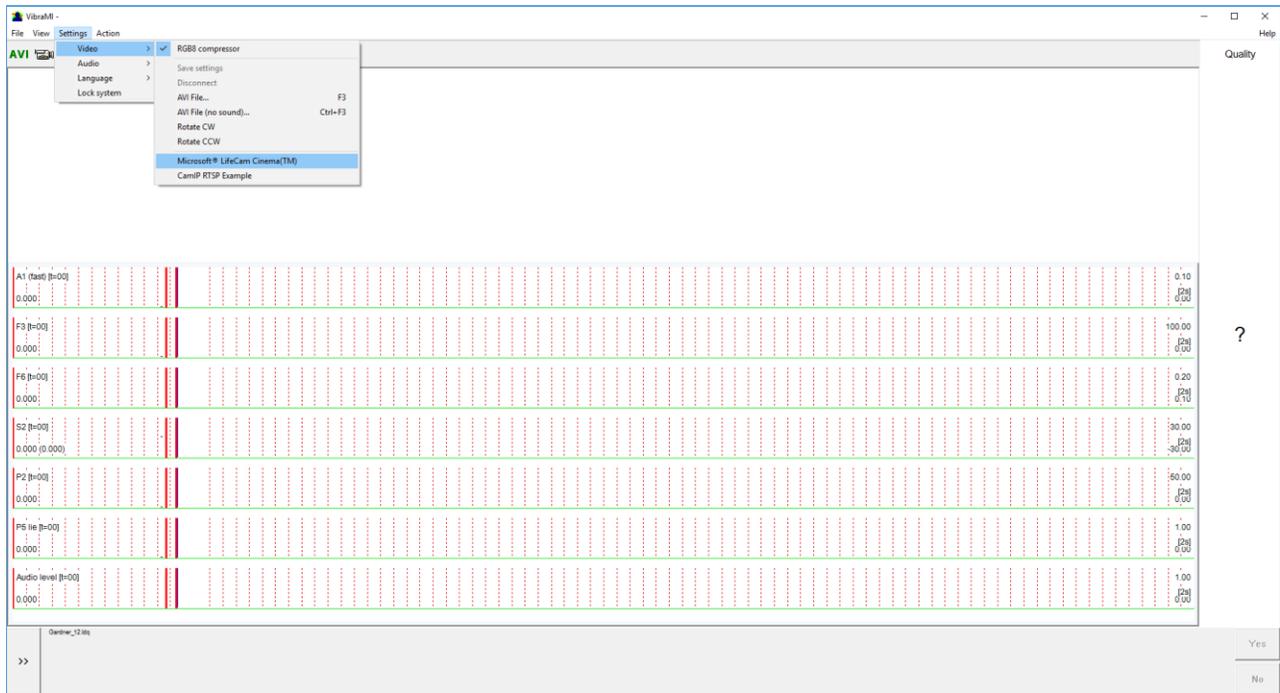


Fig. 2.7. Connection of the camera.

## 2.2 Reinstallation of VibraMI

**Note**, it is recommended to uninstall the VibraMI program before any upgrade software or hardware on PC and to reinstall after this upgrade.

For this purpose, it is necessary to execute the following actions:

1. To connect to the Internet a computer on which one of VibraMI has been installed.
2. To start VibraMI program for reinstallation on a new computer.
3. In a program window, having pressed the mouse right button, to cause the menu «**Help**» (fig. 2.8) and to choose item «**About Vibraimage...**» (fig. 2.9).

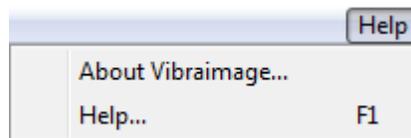
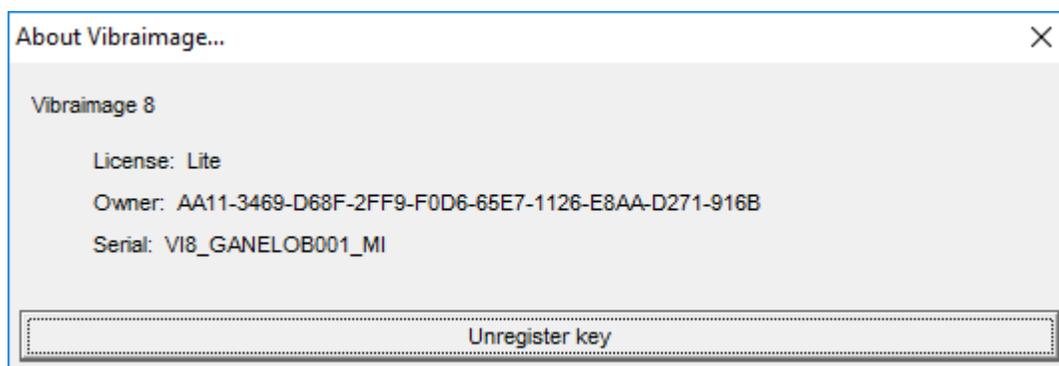


Fig. 2.8. Menu «Help»

4. In the opened window to press the button «**Unregister key**» (fig. 2.9).
5. Close the program.
6. Connect a new computer to Internet.



*Fig. 2.9. Information about the program.*

7. On the new computer to install the chosen program modification and to make registration of an «old» modification activation key through the Internet, according to recommendations of section 2.1.

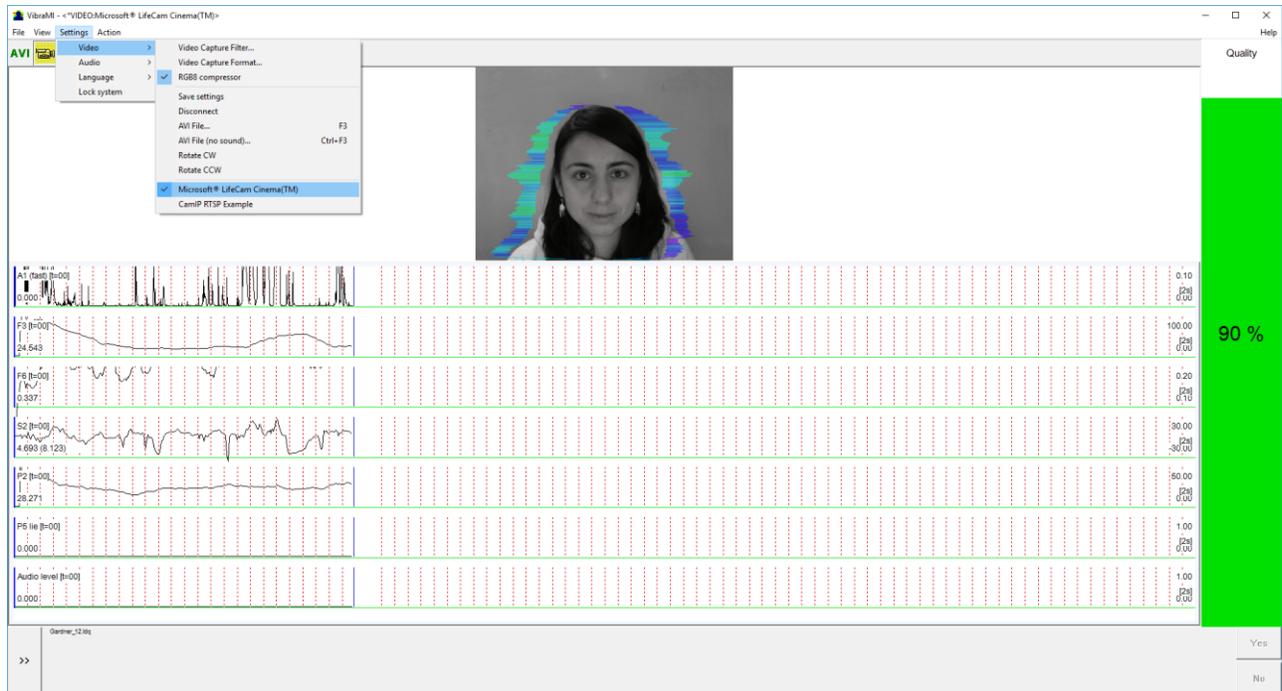
8. After successful program registration the given activation code will be fixed to the given computer.

## 2.3 Camera's setting

Standing correct camera settings is very important operation for the next vibraimage processing, because mistakes in image quality have great influence to the vibraimage processing results.

### 2.3.1 Video camera choice

It is necessary to select in the main menu «**Settings**» => «**Video**» => «**.../name used camera/...**». In figure 2.7 the process of selecting camera «Microsoft LifeCam Cinema» is shown. If the camera is connected, selected and works, then on the left of the name there will be an icon «**✓**» (fig. 2.10), and the menu will be extended with the «**Video capture filter...**» and «**Video capture format...**».



*Fig. 2.10. Example of camera choice.*

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

## 2.3.2 Video capture filter

Select «**Video capture filter.....**» in the submenu «**Video**» (fig. 2.11) for open menu of the camera settings. Item «**Video capture filter...**» appears in the menu only in case of the correct installation of camera drivers and correct choice of operating camera.

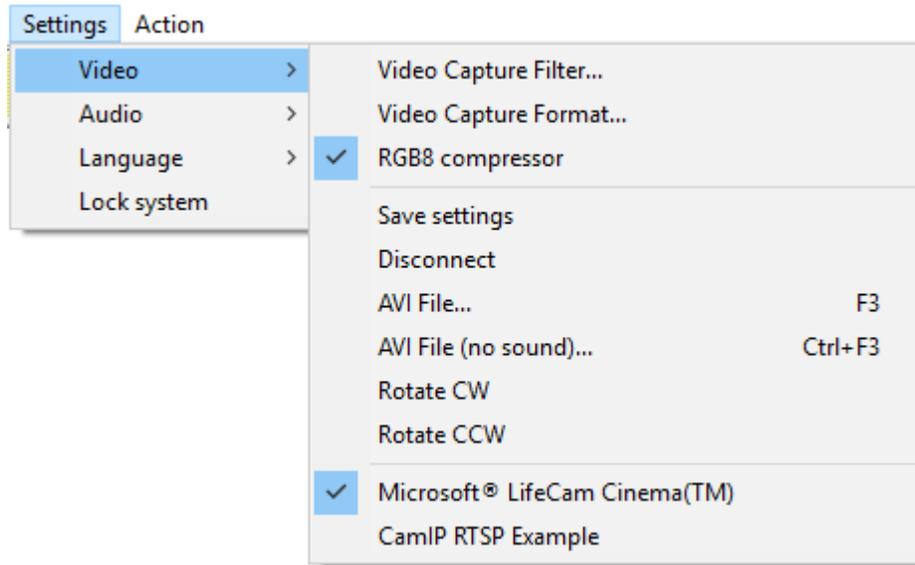


Fig. 2.11. Opening of the camera's settings menu («Video capture filter...»).

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 2.12 the window «**Settings**» for the camera «**Microsoft LifeCam Cinema**», and in a figure 2.13 for the camera «**Look 1320 V2**» is shown. Camera Microsoft LifeCam Cinema has low noise level and is preferable for vibraimage applications among webcams.

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.

Depending on the experimental conditions and light it is necessary to select auto or manual settings «Focus», «Exposure». If the illumination is constant, then it is recommended to use manual configuration, if illumination is changed (for example, the illumination of an object depends on street lighting), it is better to use automatic configuration. 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, see fig. 2.14. For other cameras it is possible to adjust other optimal zoom settings.

**Note**, program settings are set by default at each new turn on the camera. If the video conditions don't change it is recommended to save your settings using item «Save Settings» from the submenu «Video» (fig. 2.11).

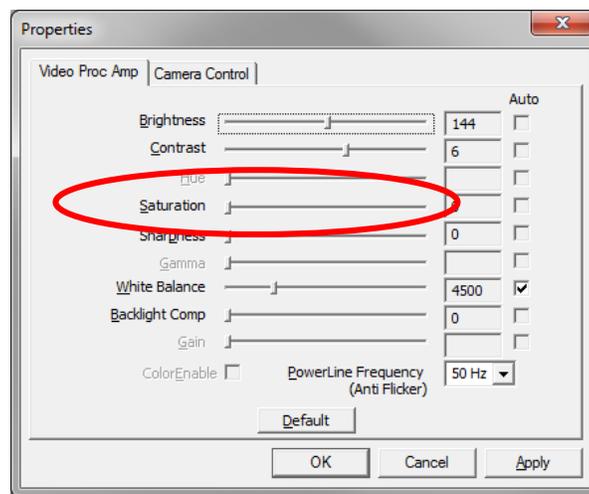


Fig. 2.12. Video setting, camera « Microsoft LifeCam Cinema»

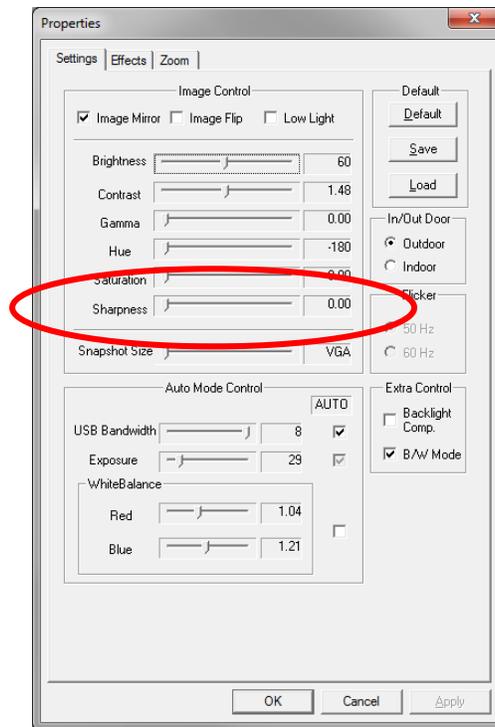


Fig. 2.13. Window «Settings», video setting, camera «Look 1320 V2»

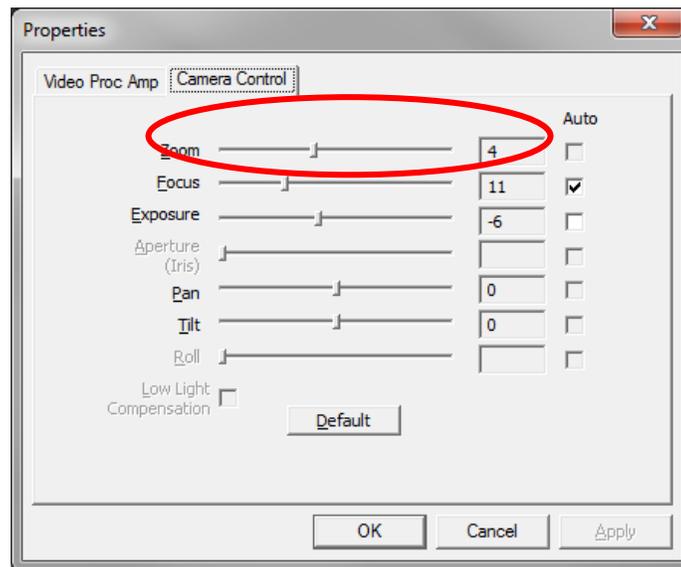


Fig. 2.14. Zoom setting, camera «Microsoft LifeCam Cinema»

### 2.3.3 Video capture format

Select «**Video capture filter...**» in the submenu «**Video**» (fig. 2.11) for open menu of the camera settings. 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**») not less than 640 x 480 px (fig. 2.15).

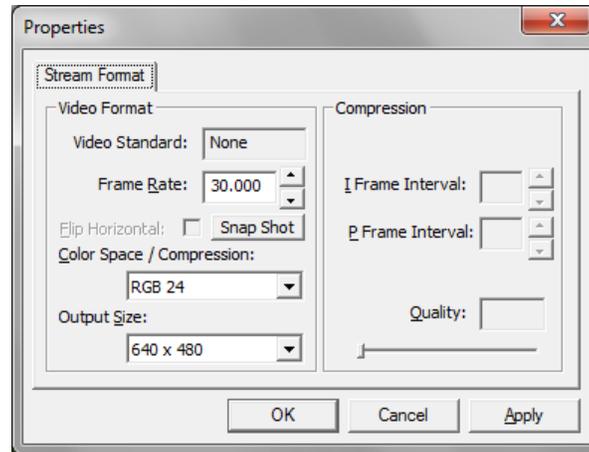


Fig. 2.15. Window «Video capture format»

**Note**, after changing camera settings in the program **VibraMI** frame rate «In» must be in the range of 25 – 30 FPS.

### 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). The inscription «Warning! Low quality (1)» in the upper left corner of the image is normal, because there is no a person's face on the video.



Fig. 2.16. Checking the camera settings on the test table, automatic regulation of the exposure (mode is recommended for unstable object illumination).

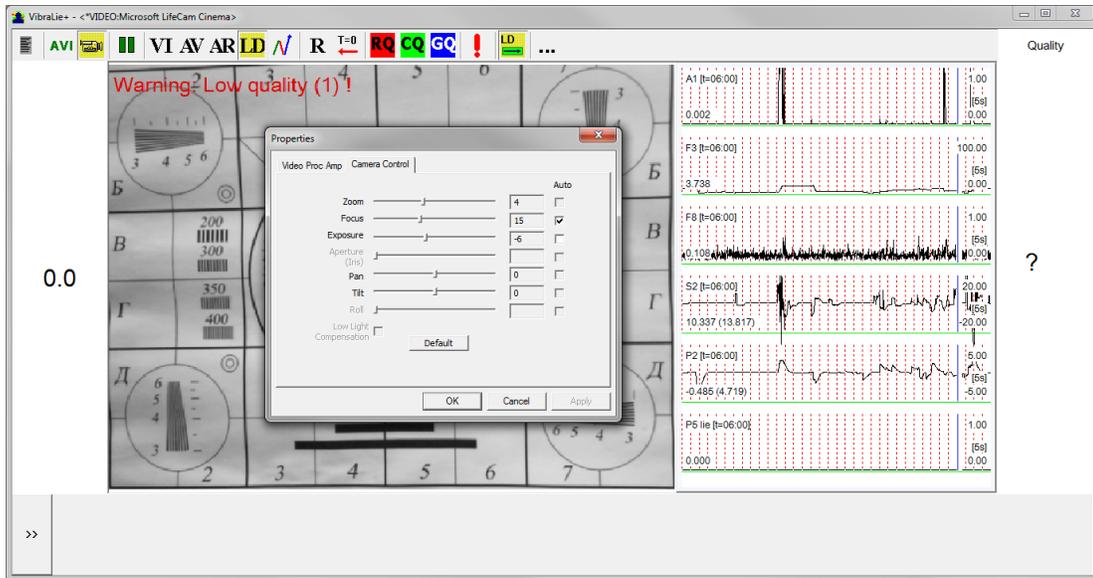


Fig. 2.17. Checking the camera settings on the test table, manual regulation of the exposure (mode is recommended for stable object illumination).

### 2.3.5 Video quality auto checking function

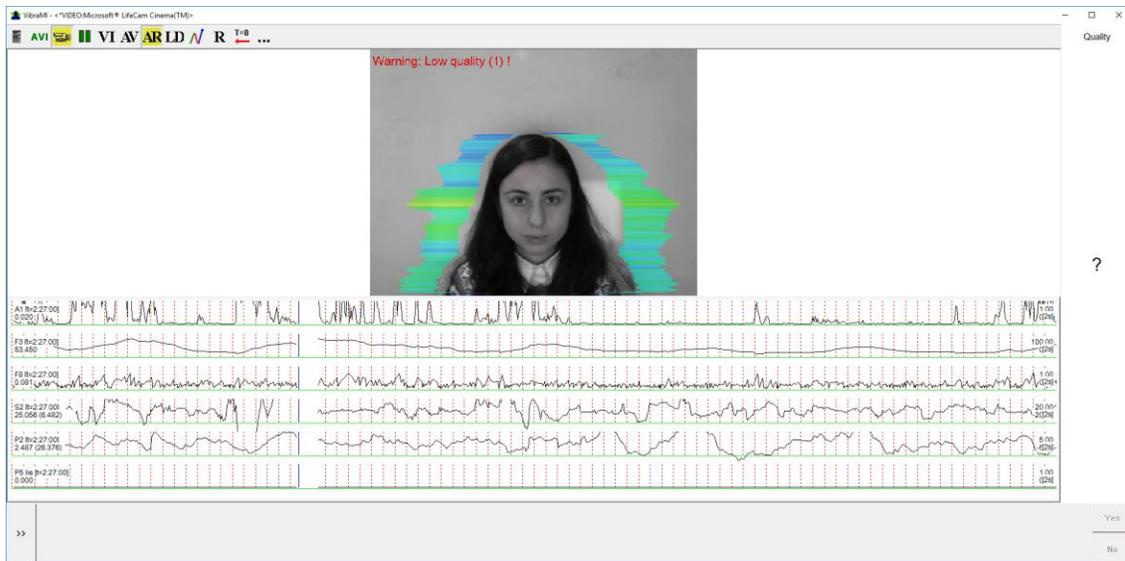
The program **VibraMI** has auto checking function and image quality control during the test. Because the definition of human reaction occurs on the video, the quality control of the processed video is necessary to get the right test result. Program gives error indication in left upper corner (fig. 2.18) of image area if the image quality is lower than standard vibrainage 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 (fig. 2.18).

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 (fig. 2.19).

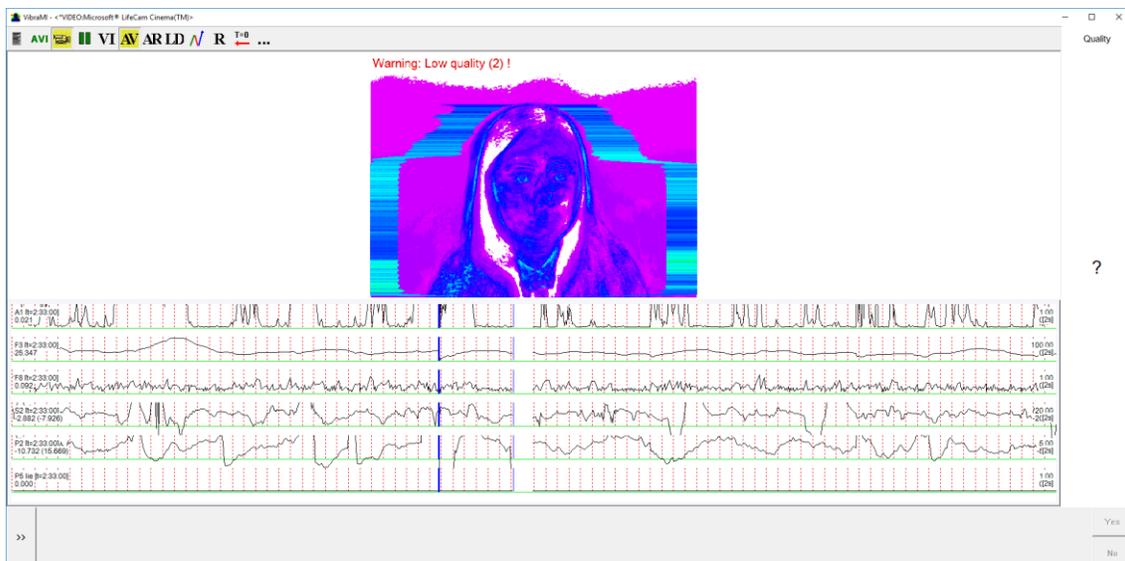
Error 3 – indicates when computer input frequency rate is lower than necessary. Requested norm for processed frame frequency is more than 25 FPS. This errors indication was done for deleting unqualified staff influence during results control (fig. 2.20). Modern web cameras via USB 2,0 interface provide input at 30 FPS when the input format is 640 x 480 px.

**Note**, before the start of the test should ensure that the program processes image of a person without any errors.



*Fig. 2.18. An example of an error message (1) at a low image quality.  
Head image size is lower than requested.*

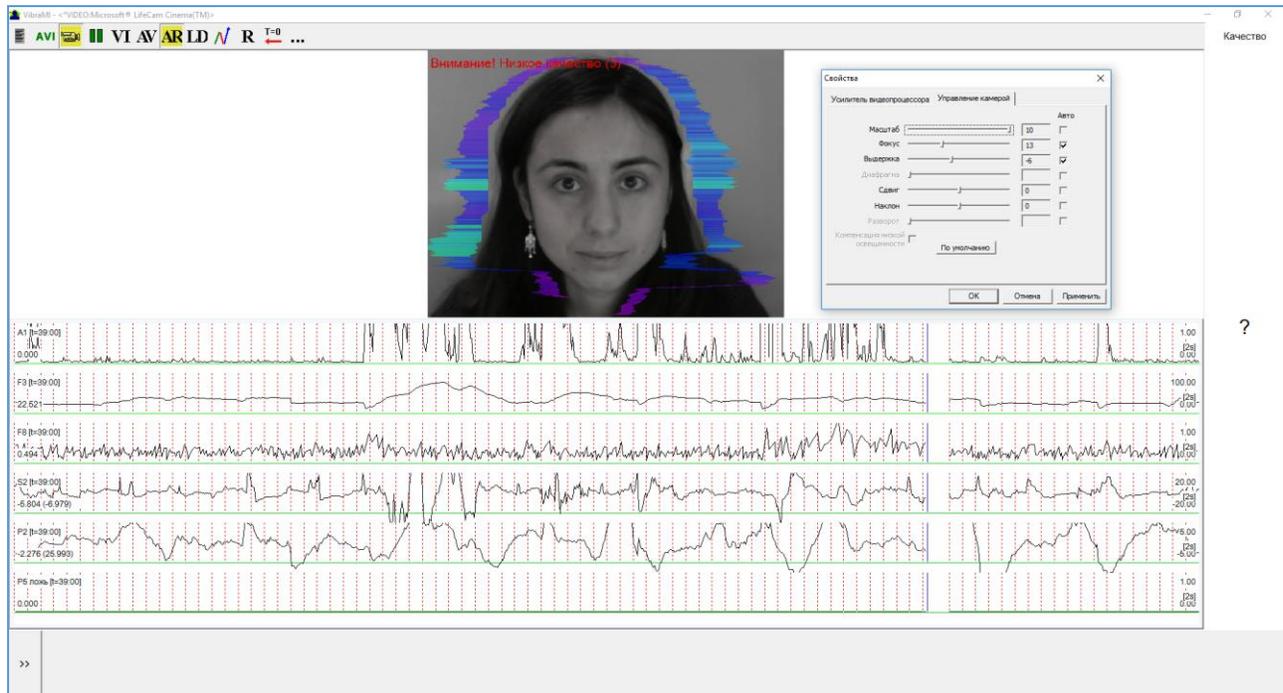
Head image size in the elements (pixels) determines the accuracy of recorded vibration and requires permanent control during the test. When tested with a video image analysis there are no strong restrictions on the movement of the test person, as required the contact polygraph. Thus, the person feels natural, which increases the accuracy of test results. However, the natural behavior can lead to the fact that the person during the response will deviate from the camera and the head image size becomes less than required. To resolve this problem vibraimage system continuously monitors a person's head size of the image and displays an error message (1) 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.



*Fig. 2.19. An example of an error message (1) at a low image quality.  
Camera vibrations is strong and on the image there is a noise.*

The figure 2.19 shows an example of strong camera vibrations. For good vibraimage you should mount the camera on a fixed support so that the vibration of the support was minimal. If the camera is mounted on a table, while working with the program you should not lean on the table.

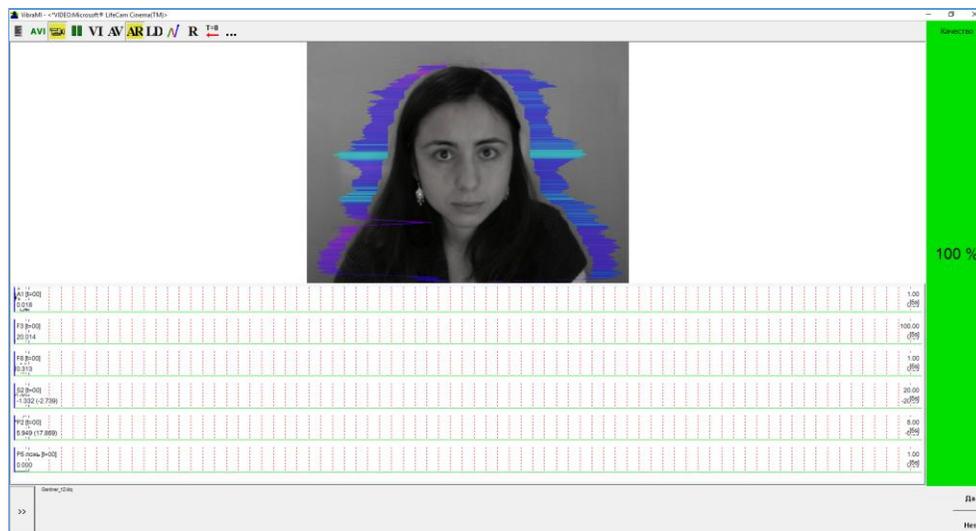
The noise of the signal from the web-camera includes a video camera noise and illumination instability and it can significantly affect the test results. Continuous calculation of the noise level should be carried out by methods similar to the measurement of the noise from the photodetector of the television camera. In this case, when you exceed the noise threshold, the system automatically displays an error message (2) (fig. 2.19).



*Fig. 2.20. An example of an error message (1) at a low image quality.  
Camera vibration*

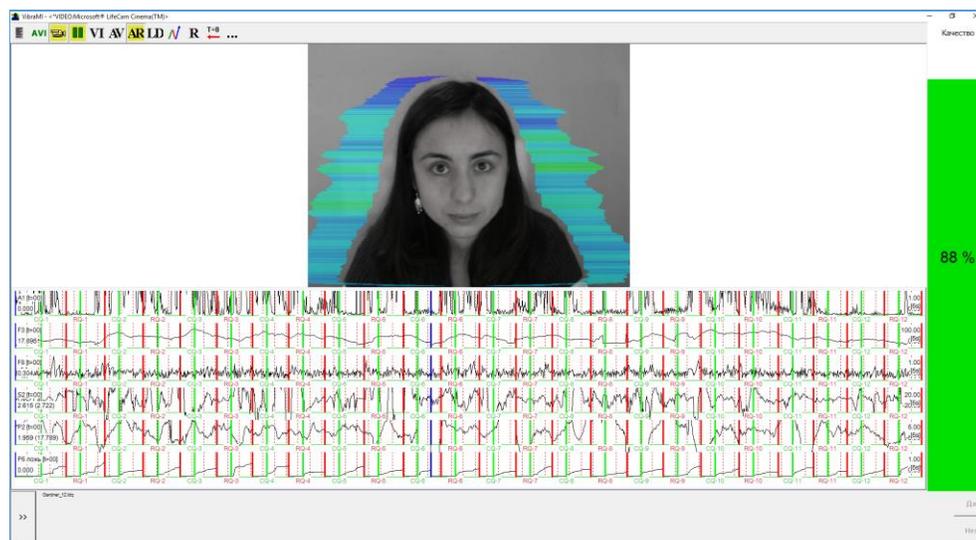
Despite the fact that the television camera may transmit 30 frame/sec with the given resolution, it does not guarantee that the computer receives and processes the incoming video data in real time. However, any deviation from the information processing in real time results to loss of information and to reducing the reliability of the test. By reducing the input and processing actual frequencies frames below the set limit, the system automatically displays an error message (3) (fig. 2.20).

In this situation, it is necessary to reconfigure parameters of the camera («Brightness», «Contrast», et al.) to increase the frame rate. For web-camera Microsoft LifeCam Cinema that happens in the case of zoom in the maximum, as shown in figure 2.21. In the case of reducing zoom should control the frame rate in the menu «Video Capture Format ...» (fig. 2.15).



*Puc. 2.21. An example of a quality column operation. Head image size and other parameters are correct.*

Quality column shows time % during the testing when image quality is equal 100 %. When we have quality indication 88 % (fig 2.22), that means 88 % of testing time image quality hasn't errors and 12 % of testing time image quality includes errors with the number 1 or 2 or 3.



*Puc. 2.22. Quality test shows 88 %*

Pressing button R reset image quality to the beginning 100 %. In lie detection mode and M mode image quality is very important and testing with image quality lower 80 % could not be acceptable for processing.

### 3 VibraMI. User's manual

Psychophysiological profiling system VibraMI software solves the following tasks:

- determination of the maximum human abilities area for its professional activities;
- professional orientation test;
- profiling and disclosure of the personal characteristics;
- research and measurement of psychophysiological and emotional states of a person;
- research and ranking of psychophysiological responses to presented stimuli.

After start of VibraMI and connection of the video device (fig. 3.1) in the main window there is an image from connected video device.

#### 3.1 Main window

Main window (fig. 3.1) consists of the following parts:

1. main menu;
2. image area;
3. questionnaire panel;
4. tools panel;
5. name of running VibraImage module, model of video source (Video camera model or AVI file name) & type of video source (Video camera or AVI file);
6. quality test column.

**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.

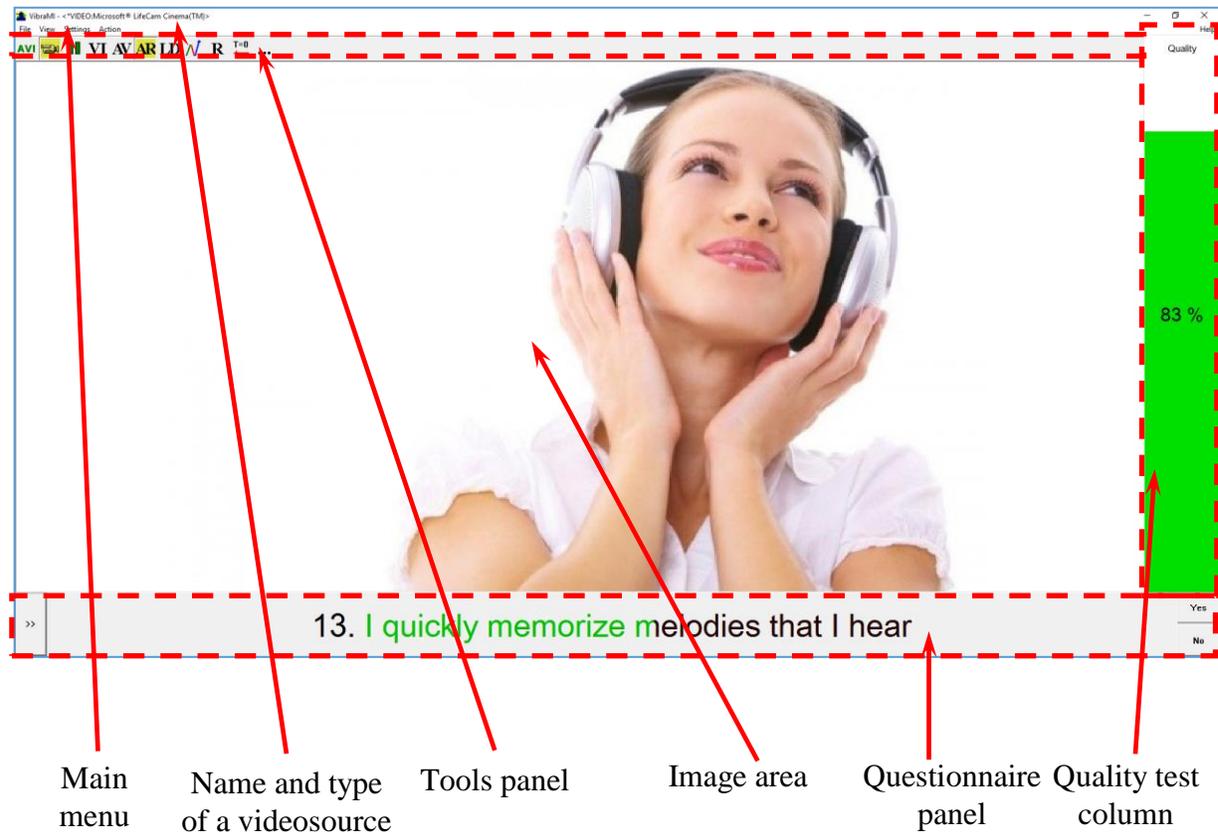


Fig. 3.1. Main window *VibraMI*.

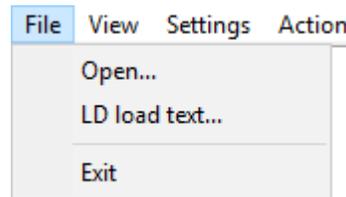
## 3.2 Main menu

The main menu contains the following items:

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

### 3.2.1 Menu File

Menu «**F**ile» (fig. 3.2) contains following items:



*Fig. 3.2. Menu «File»*

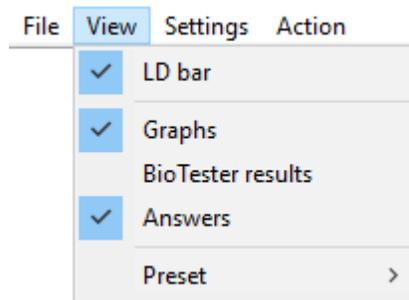
Item «**O**pen...» – for viewing and printing the saved file of XML format with parameters of system for the supervision interval.

Item «**L**D load text...» – load questionnaire file with format «\*.ldq» for mode «LD text».

Item «**E**xit» – allows quitting the program.

### 3.2.2 Menu View

Menu «**V**iew» (fig. 3.3) contains following items:



*Fig. 3.3. Menu «View»*

Item «**L**D bar» - switch on/off the questionnaire (LD) panel.

Item «**G**raphs» - show/hide graphs with parameters below the video.

Item «**B**ioTester results» - show/hide window with biotester analysis results.

Item «**A**nswers» – answer is given by pressing buttons Yes/No.

Submenu «**P**reset» – choice of visualization mode:

**LD** - real video image,

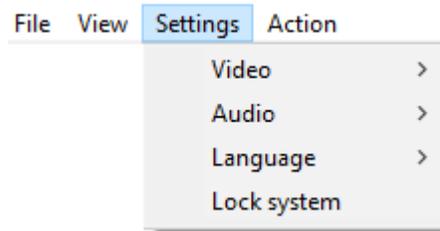
**AR** - external vibraimage (vibra-aura) around real video image,

**AV** - vibra-aura around internal vibraimage,

**VI** - internal vibraimage.

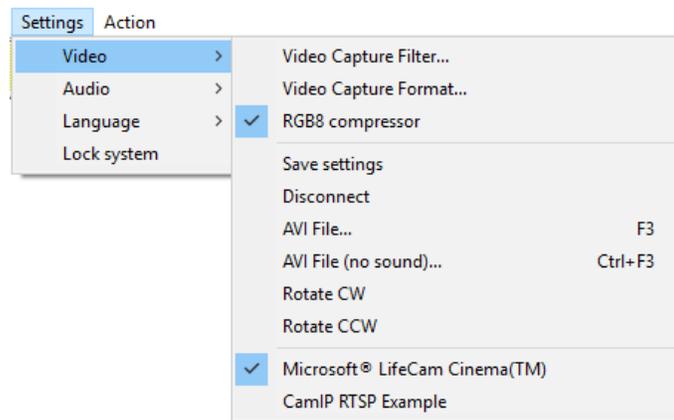
### 3.2.3 Menu Settings

Menu «**Settings**» (fig. 3.4) contains following items:



*Fig. 3.4. Menu «Settings»*

Submenu «**Video**» – video settings (see 2.3):



*Fig. 3.5. Submenu «Video»*

Submenu «**Video**» contains options of video modes. It can differ depending on connected devices. For example this menu contains the following items (fig.3.5). You can choose as video source one from many installing in PC video-devices or load external video file.

Subitem «**Video Capture Filter...**», «**Video Capture Format...**», «**Save settings**» - (see 2.3)

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

**Note**, for connection to system of network IP cameras (for example, in figure 3.5 CamIP RTSP Example) and adjustments of their parameters the additional software CamIP.exe [http://www.psymaker.com/downloads/CamIP\\_installer.msi](http://www.psymaker.com/downloads/CamIP_installer.msi) is used.

Subitem «**Disconnect**» allows disconnecting all video camera or video file.

Subitems «**AVI File...**» and «**AVI File (no sound)...**» are intended for selecting for the analysis of an external video file. The file can be loaded with a sound and without sound.

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

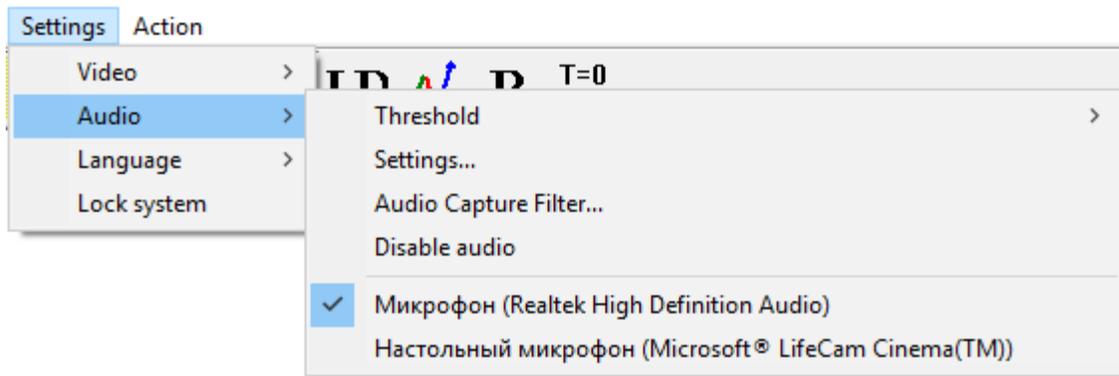
Submenu «**Audio**» contains settings of audio modes. It is can differ depending on connected devices.

Subitem «**Threshold**» allows setting the value of the sound threshold for correctly **VibraMI** operation.

Subitem «**Settings...**» allows adjusting settings.

Subitem «**Audio Capture Filter...**» allows adjusting the microphone selected for operation (see items below).

Subitem «**Audio Capture Filter...**»



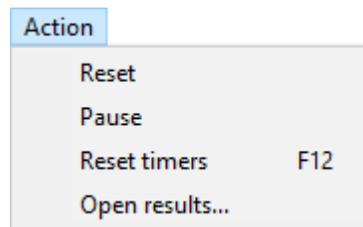
*Fig. 3.6. Submenu «Audio»*

Submenu «**Language**» (fig. 3.6) allows to choose a language.

Item «**Lock system**» (in development) is used to lock of all toolbar buttons from stray keystroke. To unlock the system, press the icon **VibraMI** «» in the top left corner of the screen.

### 3.2.4 Menu Action

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



*Fig. 3.7. Menu «Action»*

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

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

Item «**Reset timers**» – reset to «0» all timers: video file timer, graph timer. The conclusion video and construction of graph begins all over again.

Item «**Open results...**» – allows to open the database folder where you saved the images and all results.

### 3.3 Tools and LD panels of VibraMI program

VibraMI toolbar (fig. 3.8) contains following buttons:



Fig. 3.8. VibraMI toolbar.

All toolbar buttons (fig. 3.8) duplicated the corresponding items in the menu system. When the tool tip determines the assignment of toolbar buttons. Note, the selected toolbar button is highlighted in color or volume, depending on the main window style.

-  – AVI files download for PDD analysis;
-  – live video camera connection;
-  – pause on image and program operations;
-  – choice of internal vibraimage mode (VI);
-  – choice of external vibraimage (vibra-aura) around internal video image mode (AV);
-  – choice of external vibraimage (vibra-aura) around real video image mode (AR);
-  – choice real video image mode (LD);
-  – open window with psycho-energy condition graph display;
-  – R – reset parameters and graphs to 0;
-  – T= 0. setting to zero graphs on the timeline and installation of video being played in the beginning of the file;
-  – open the folder where you saved the images and measurement's data.

LD panel of VibraMI program shown on fig. 3.9.



Fig. 3.9. LD bar. Starting of a questionnaire.

One-clicking on the button on the LD bar let start a questionnaire at that moment. Double-clicking returns to the beginning of the questionnaire and the video file. The questionnaire can be selected by putting on the item «LD load text...» in the menu «File».

After the choice of the file, for example, Gardner\_12 (fig. 3.10), the program passes into the mode of reading and visualization of a questionnaire. The person conducting survey reads the questions which are displayed in the karaoke mode.



Fig. 3.10. Loading a new questionnaire.

The user may develop owns questionnaires on topics of interest to him and put them in the installation directory \VibraMI\ in the same file format **ld\_XXXXXX.ldg**.

If you work in mode «Answers» buttons Yes/No will appear on the right side of LD bar (fig. 3.11).

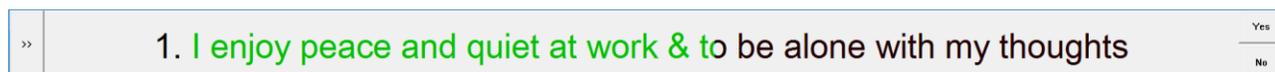


Fig. 3.11. LD bar. Mode with answers Yes/No.

## 4 **VibraMI** operation principles

**VibraMI** is program for psychophysiological testing (PPT) of a person by the vibraimage technology and questionnaire for detecting non-cognitive abilities and personality characteristics.

The basis of **VibraMI** analysis is the comparison and processing of conscious response to questions (answers Yes/No of the test person) and subconscious human psychophysiological response, measured by vibraimage technology and similar to lie detection. Shown questions (images) sequentially are grouped according to the following multiple intelligence (MI) types:

1. Intrapersonal (IA)
2. Existential-Theoretical (ET)
3. Logical-Mathematical (LM)
4. Business-Mercenary (BM)
5. Visual-Spatial (VS)
6. Naturalistic (NL)
7. Musical-rhythmic (MR)
8. Bodily-kinesthetic (BK)
9. Ascetic-Sacrificial (AS)
10. Verbal-linguistic (VL)
11. Bohemian-Demonstrative (BD)
12. Interpersonal (IE)

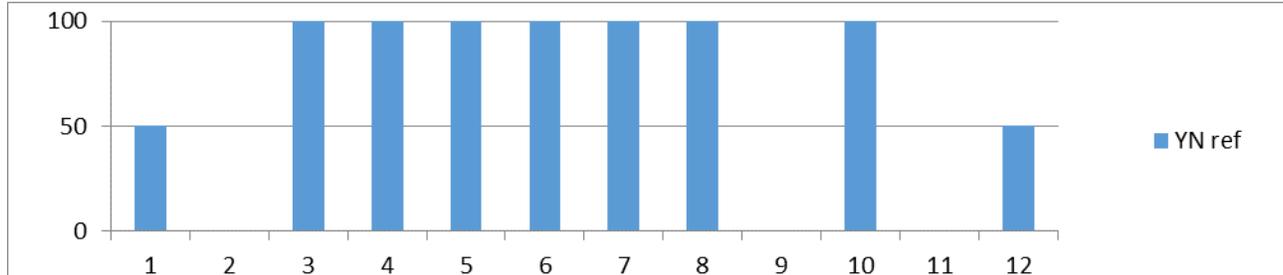
### **Conscious response when answering the question in Yes/No format (Kr)**

Let's consider conscious reaction of the test person at the answer to two consecutive questions relating to one type of intelligence for Gardner12 questionnaire. Questions in this questionnaire are made so that the person with the developed type of multiple intelligence answered to a first question «Yes», and on the second question - «No». At the answer to the corresponding couple of questions of the second questionnaire of Gardner12S, people with the developed this type of intelligence have to answer Yes and Yes. For example, on questions of a questionnaire Gardner12 concerning Visual-Spatial intelligence:

1 I understand information better in the form of a chart

2 It's easier and more comfortable to understand information when I hear it

In the given example the test person answers to a first question «Yes», and to a second question «No» (Yes/No), then value of 100% is conditionally appropriated to the parameter «K» for the 5 VS group (fig. 4.1, columns 3 - 8, 10). If answers are «Yes/Yes» or «No/No», then «K» is 50 % (fig. 4.1, columns 1, 12). If a person responds negatively to the first question and to the second - positively (No/Yes), then  $K = 0\%$  (fig. 4.1, column 2, 9, 11.).



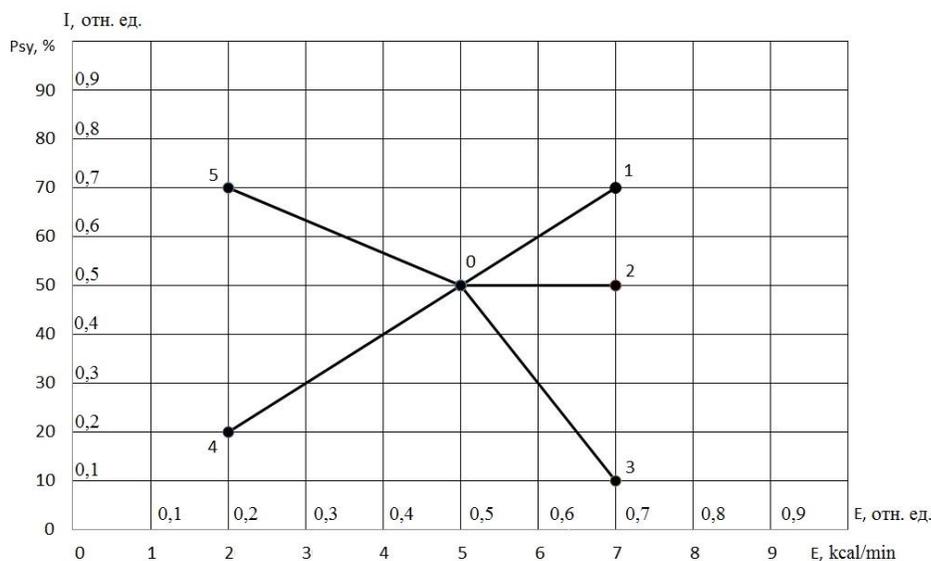
*Fig. 4.1. The resulting graph of the parameter K for the types of intelligences*

### **Psychophysiological (subconscious) reaction IE**

The subconscious reaction is measured by analyzing the information state and energy state (IE) as general features of psychophysiological state by vibraimage technology. This technology is similar to psychophysiological detection of deception and confirms or rejects conscious response based on positive or negative reaction of the examined person on the indicated stimulus.

As an example we will consider the change of a psychophysiological status (PPS) of the person given in a scale information - energy in fig. 4.2 Actual PPS is displayed in the form of a point and change of person's PPS in time is displayed in the form of a straight line or a curve between two points. The example of PPS change from a state 0 in various states 1, 2, 3, 4, 5 is given in figure 4.2.

As shown in fig. 4.2 on the information-energy diagram changing from initial PPS (point 0) to other states is characterized by one change of consumed energy and different states of psychological comfort.



*Fig. 4.2. Information-energy diagram of the PPS.*

Transition 0-1 is characterized by an increase in energy consumption and improvement of psychological state. The reason of this PPS change can be a good or pleasant news (the stimulus), it leads to a more intensive exchange processes (increase in energy consumption), and the psychological condition and mood notably improved (entropy of metabolic processes decreased, and the information content of the exchange increased).

Transition 0-2 is characterized by an increase in energy consumption and an even level of psychological state. The reason can be, for example, an increase in mental and physical activity, which lead to more intensive exchange processes (increase in energy consumption), at the same time, the psychological state and mood are unchanged, as conducted by the impact did not cause emotional changes.

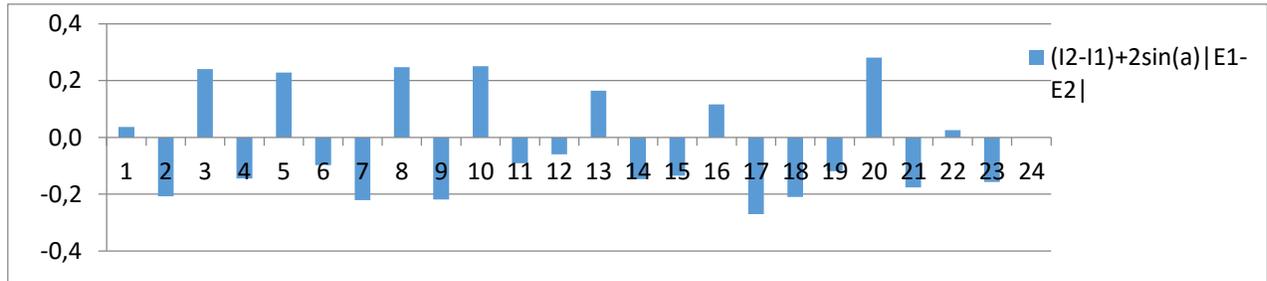
Transition 0-3 is characterized by an increase in energy consumption and impairment of psychological state. The reason can be unpleasant information that leads to a more intensive exchange processes (increase in energy consumption), and the psychological condition and mood became notably worse (entropy of metabolic processes became worse, and the information content of the exchange decreased).

Transition 0-4 is characterized by a decrease in energy consumption and impairment of psychological state. The reason can be unpleasant information that leads to a slowing of metabolic processes (reducing energy consumption), and the psychological condition and mood became notably worse (entropy of metabolic processes became worse, and the information content of the exchange decreased).

Transition 0-5 is characterized by a decrease in energy consumption and improvement of psychological state. The reason can be pleasant news, which soothes and slows down the metabolic processes (reducing energy consumption), and the psychological condition and mood are notably

improved (entropy of metabolic processes decreased, and the information content of the exchange increased).

These explanations describe the physiological processes on a qualitative level, and **VibraMI** program produces a quantitative calculation of information-energy processes occurring in the person upon presentation of stimulus. **VibraMI** shows the calculated human physiological reactions after each question in the form of an information chart (fig.4.3).



*Fig. 4.3 Measurement of the psychophysiological responses to stimulus*

Detail field of professional orientation is done based on the International Standard Classification of Education (ISCED) 2013 ([ISCED-F 2013](#))

## 5 Saving and analyzing results

Test results can be viewed using standard Windows functions, such as pressing the PrintScreen and download images from the screen to any standard program such as Paint to view graphics.

After completing of the questionnaire program **VibraMI** automatically creates files with the test results in the directory «C:\Users\user\Documents\MI Result».

The result of testing recorded in the form of files of the following types:

- **vi YYYY-MM-DD HH\_MM\_SS\_e.xls** – Excel file with the measurement results;
- **YYYY-MM-DD HH\_MM\_SS \_measurement.xls** – Excel file with psychophysiological status of the person during the testing;
- **vi YYYY-MM-DD HH\_MM\_SS.txtH.png** – a graphic file with the histogram of frequency distribution;
- **vi YYYY-MM-DD HH\_MM\_SS.txtT.png** – graphic file with graphs of I-E state of a person changes over the period;
- **YYYY-MM-DD HH\_MM\_SS\_measurement.png** – the graphic file with vibraimage of the tested person, allowing estimate correctness of the taken measurements from the point of view of shooting conditions;
- **vi YYYY-MM-DD HH\_MM\_SS.txt** – the total text file with the results of measurements of parameters;
- **vi YYYY-MM-DD HH\_MM\_SS\_e.txt** – a text file with a list of questions with the ranking of reaction to them, calculated by different algorithms (A, M, I, S, S1, At, It, IE);
- **vi YYYY-MM-DD HH\_MM\_SS\_row.txt** – a text file with the results of the measurement parameters on questions for statistical processing;

In all files in names **YYYY-MM-DD** and **HH\_MM\_SS** date and time of measurement.

## 5.1 Main test results

The main results of PPS changes during the PFT is presented synchronously with graphical and text information stored in xls file (fig. 5.1) and in text files.

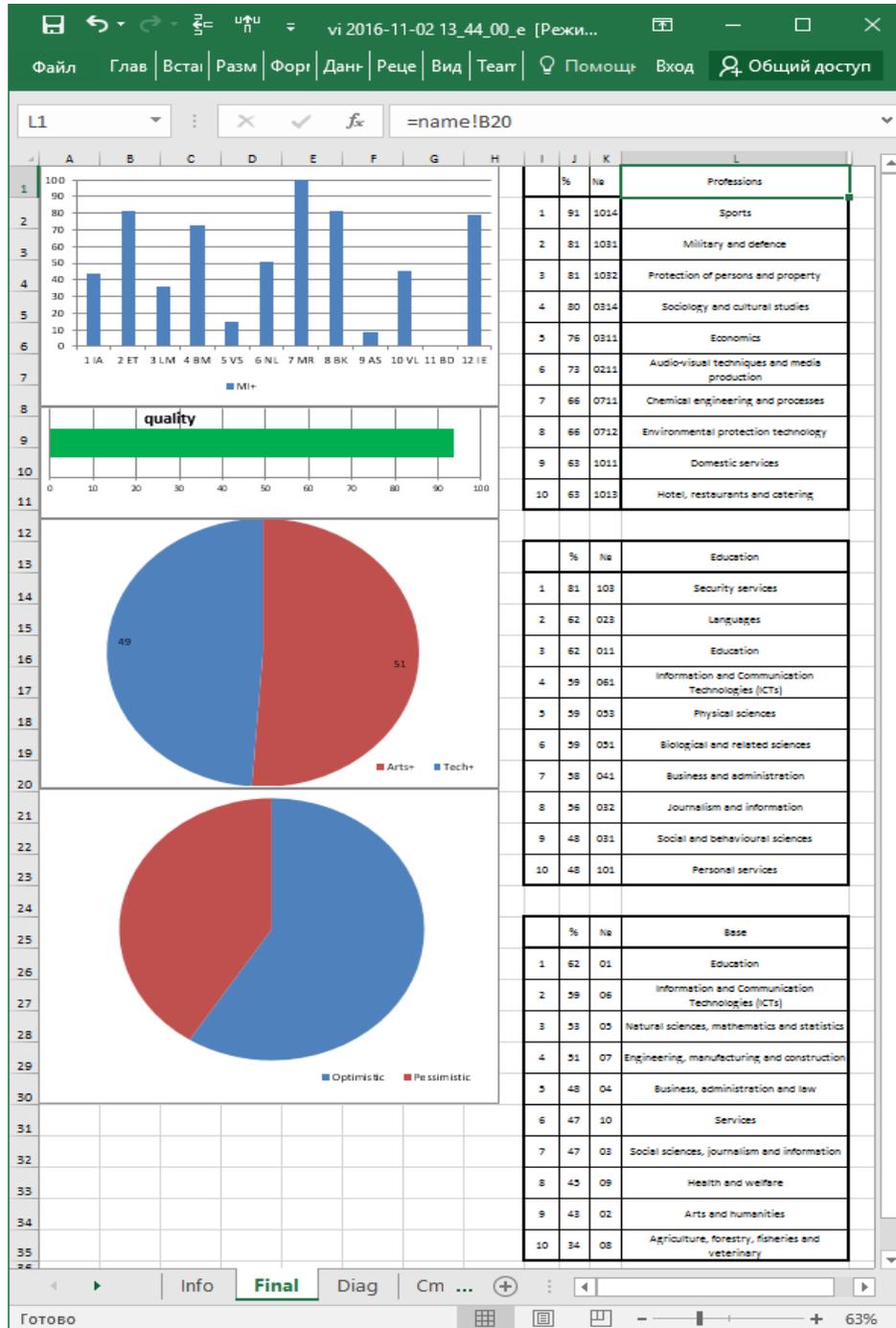


Fig. 5.1. Example of an Excel file with the test results.

**Note**, if the camera settings and shooting conditions are wrong, then in the text file **vi YYYY-MM-DD ChCh\_MM\_SS\_row.txt** at the end of the question and at the end of the file message about the specific reasons for the error with the quantitative contribution to the overall quality is appeared.

The pie charts show the relationship in human propensities percentage of Arts (fig. 5.1 - 51 %) and Tech activities (49 %) and view of current status Optimistic (59 %) and Pessimistic (41 %).

The relation of the person to a certain type of the personality as a percentage is given in the histogram.

1. Intrapersonal (IA)
2. Existential-Theoretical (ET)
3. Logical-Mathematical (LM)
4. Business-Mercenary (BM)
5. Visual-Spatial (VS)
6. Naturalistic (NL)
7. Musical-rhythmic (MR)
8. Bodily-kinesthetic (BK)
9. Ascetic-Sacrificial(AS)
10. Verbal-linguistic (VL)
11. Bohemian-Demonstrative (BD)
12. Interpersonal (IE)

According to this final histogram fig. 5.1 tested person is a little more Arts than Tech because the sum of values on types 1 VI – 6 PR (in the left part of the schedule) gives 49 % and sum 7 MP - 12 ML gives 51%.

The most developed intelligence types for this person are, Musical-rhythmic (7), Bodily-kinesthetic (8), Existential-Theoretical (2), Interpersonal (IE). According to certain types of intelligence the program recommends the list of professions of the most suitable for this person as **Sports, Military and Security, Protection of Person and Property.**

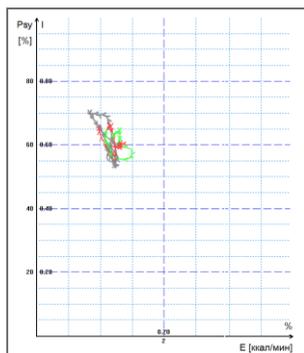
Tab info, Diag, Cmp, AT, stat, def, Files, IE, IEQ, YN, YNQ, set, calc12, name, gLang, Lang, BroadX, ProfX, EduX, BroadC, ProfC, EduC, BroadS, ProfS, EduS contain additional information for statistical processing of test results.

## 5.2 Graphics of PPS changes

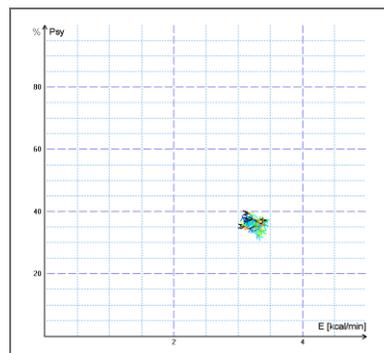
Changing of I-E state of a person to a controlled period of time clearly displayed on the graph (see. fig. 5.2). Only a person who is in a relaxed or in a state of high concentration (see. fig. 5.2b) may be in a fixed I-E state during such insignificant time as 1 minute. Most of the people make a noticeable fluctuations of I-E state, even for short periods of time, depending on their thoughts (see. fig. 5.2a) and under the influence of the environment (see. fig. 5.2c).

Color line of I-E state changes corresponds to the «color» of the test question:

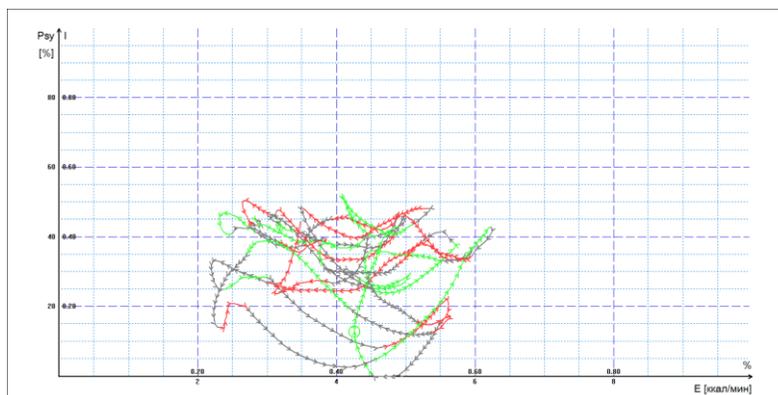
- time between questions – grey;
- control questions – green;
- relevant questions – red.



a) Changing around the average value



b) Stable condition, indicating a high degree of self-control person..

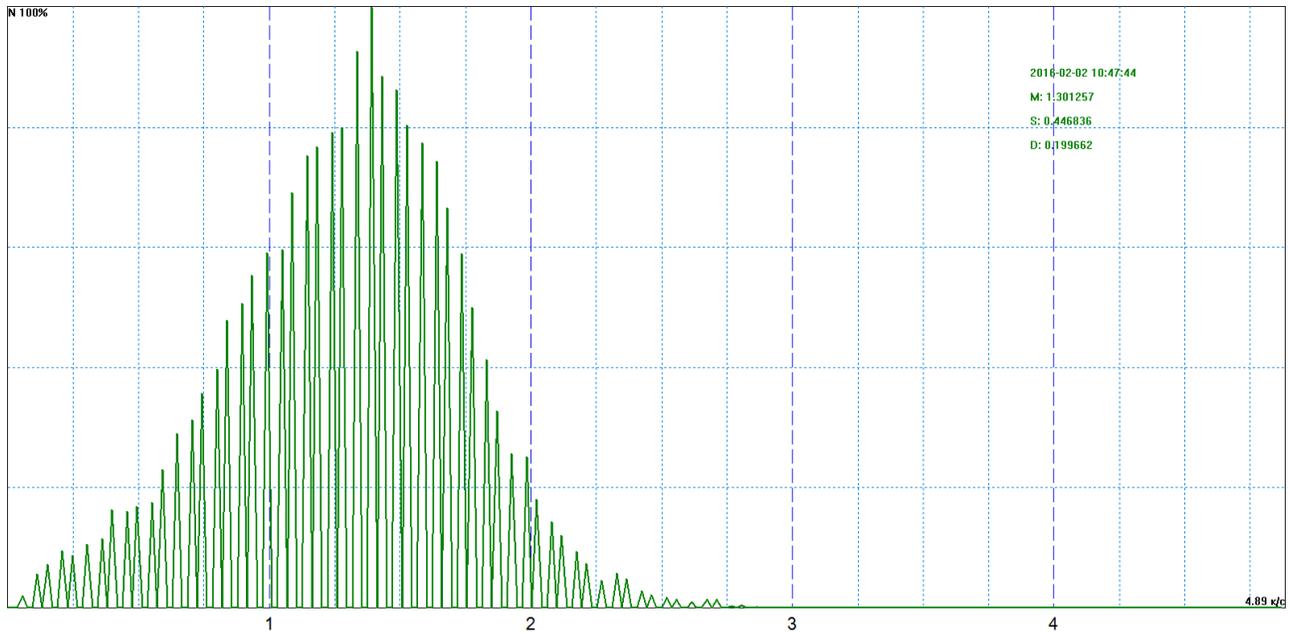


c) Periodic change I-E state along a certain trajectory, usually characteristic for an interview, type a question-answer

Fig. 5.2 (a, b, c). Change person psycho-energy conditions for the chosen period.

### 5.3 Frequency histogram of PPS

The frequency histogram (fig. 5.3) of PPS shows the total distribution of the tested person vibrations for all the test time. The similarity of the received histogram to the normal law of distribution means a normal state of the tested person during the test. Asymmetry or multimodality of the received histogram argue of certain deviations from the norm during the test.



*Fig. 5.3 Example of frequency distribution histograms.*

## 5.4 Psychophysiological status of the person

1. Every from T1-T10 psychophysiological parameters measured by vibraimage system are specified to range 0 - 1 (0 - 100) % using fixed coefficients experimentally selected.
2. Mathematical formula by which measured psychophysiological parameter is determined is primary, and a code name (for example, Agression) is secondary. Psychophysiological meaning of each parameter T1-T10 may be varied depending on the experimental conditions.
3. The set of measured parameters T1-T10 determines the total psychophysiological (psychosomatic, functional) status of a person based on the integral coefficient K.

Statistical processing of parameters measured in a mode «**M**» is carried out by the program Vibrastat.

For more information about this file (fig. 5.4) refer to «Behavior Detection System. VibraImage 8 PRO. Manual», [http://www.psymaker.com/downloads/VI8\\_1ManualEng.pdf](http://www.psymaker.com/downloads/VI8_1ManualEng.pdf) in the section «M Mode».

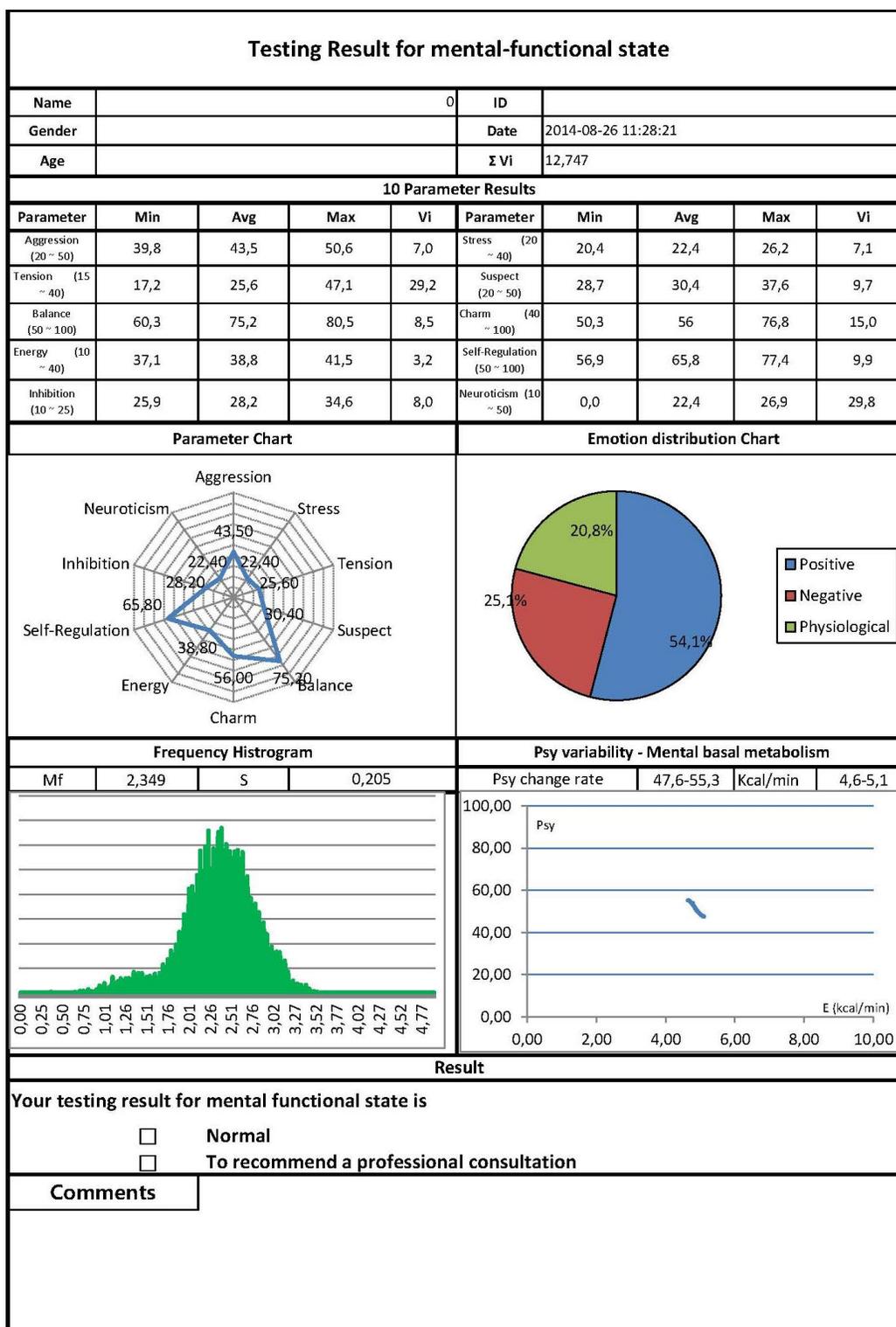


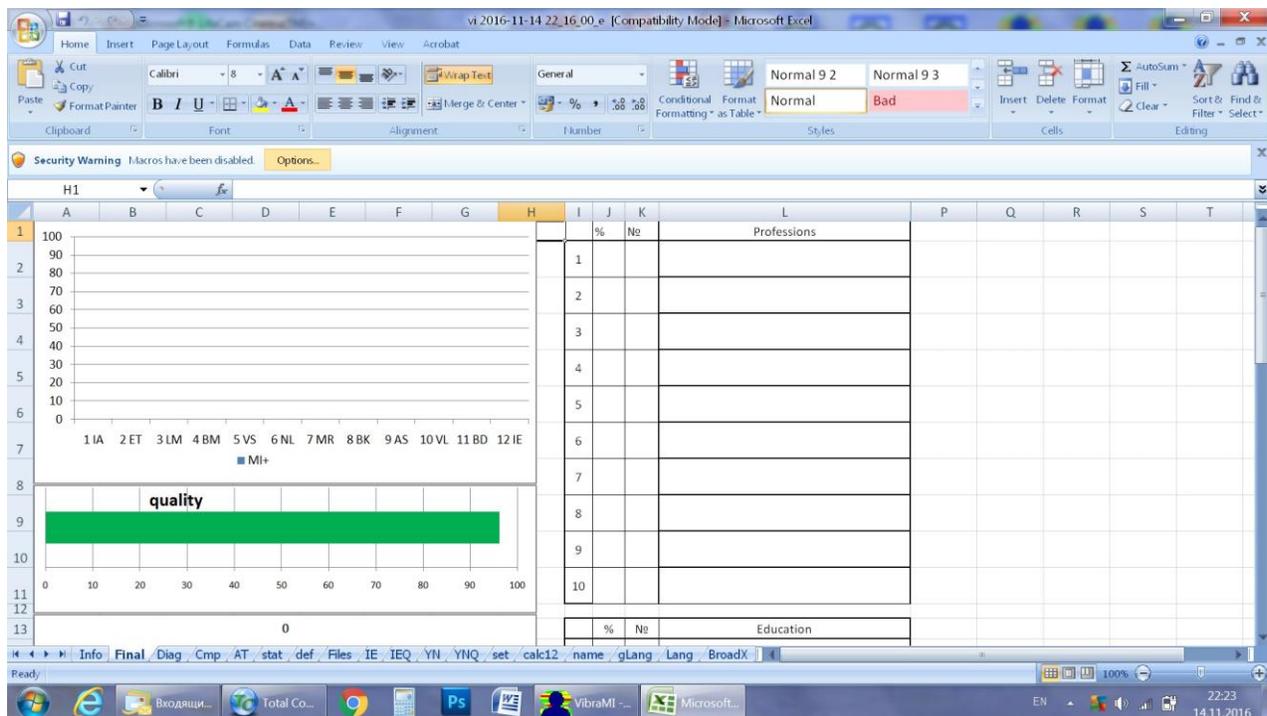
Fig. 5.4. Psycho-emotional status of the person

## 5.5 Recording of technical test results. Excel file start

Full record of values parameters registered by vibraimage system is recorded to a text file with the ending row. This file can be used for statistical research and testing of algorithms for determining PPS and PFT.

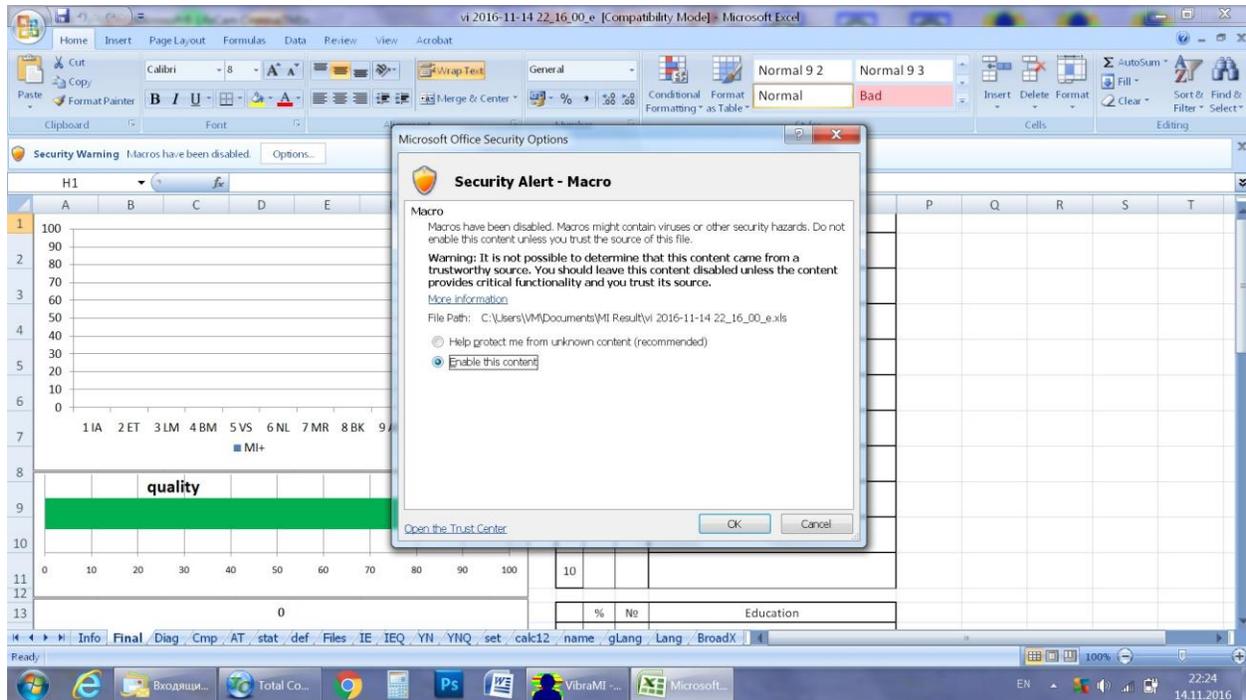
This file can be copied and transferred to Excel for self-treatment.

**Note**, if Macros have been disabled in current Excel program you need to start Macros in manual mode. In this case after test finishing you will see empty table as it is shown on Fig 5.5



*Fig. 5.5. Empty table of excel file with disabled macros*

In this case you need to enable Macros function in the manual mode as it is shown on the fig 5.6.



*Fig. 5.6. Macros enable function start*

Concrete interface of Macros function enabled depends on the version of stand Excel program and can differs from fig 5.5 and 5.6. So you need to use Excel help for starting Macros function in the opened file for calculation of MI parameters.

## 6 Warranty

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

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Version **VibraMI**

November 2016

Updates and questions on [www.psymaker.com](http://www.psymaker.com)

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