Health Testing Program

HealthTest (Lite)

Version HTML

Manual

Version: 10.2.1.26

ELSYS Corp.

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CONTENT

1 Introduction

HealthTest unites people

Many people think that we are now living in a very difficult time. They probably think that in the past during the plague epidemics it was easier to live. Others suggest that having modern technology makes a person better than he was thousands of years ago. However, a person and consciousness changes very slowly, and no technical innovations will protect a person from the fear of death. Each century forms its own challenges, and each person, company or country reacts differently to these challenges. Elsys has been involved in biometrics and psychophysiology for almost 30 years. To analyze the human response to stimuli is our task, we solve it with the help of vibraimage technology. Unfortunately, quarantine and separation of people turned out to be the main means of today's struggle of humanity with coronavirus for survival. Moreover, the conditions of separation are very different for many people. Therefore, it is necessary to propose a means, which does not divide, but unites everyone of combating a new misfortune - the coronavirus. What can better unite all people than a computer program for determining human health? Yes, of course, we know that no one has done such a program yet, and even the formulation of such a task is not considered scientific, because modern medicine does not deal with health, but deals with diseases.

We planned to make a coronavirus diagnostic program, all we needed for this was the required video of patients infected with coronavirus. I sent my first request to our Chinese partners at the beginning of January this year, when many had not heard anything about this disease. However, bureaucratic barriers turned out to be stronger than reason and, despite two months of promises, we still did not receive the required data for diagnosing the disease. Then I decided that if is impossible to solve the problem with the right method, then I would have to solve it differently. After all, if a person is healthy, this automatically means that he does not have a coronavirus. Furthermore science is constantly evolving, and what was considered non-scientific yesterday is today perceived as absolute truth, and tomorrow it would be perceived with a smile. I think the time has come to reconsider approaches to human health and illness. Therefore, we tried to approach the problem of human health so that every user of a computer or mobile phone could objectively answer a simple but very important question - am I sick or healthy? I will not load readers with the technical details of our solution, but will try to briefly explain its principle. HealthTest uses a webcam to analyze the reflex movements of human head, which are associated with all physiological systems. If a person has some kind of disease or pathology, then the rhythm of micromotion of the human head is disrupted and the HealthTest program digitizes these disorders, converting it into a health coefficient.

I am sure that in the near future, such an approach (or similar) will be the basis of medical diagnostics, which will begin with the determination of health indicators. Everyone has long known one of these indicators - this is body temperature. However, the reflex movements of a person are more sensitive to health disorders than temperature regulation, and many diseases can proceed without temperature. Therefore, the physiology of reflex movements and activity should be an information indicator of health.

I hope that the HealthTest program will unite and equalize all people who fear for their health. All that is needed now for testing health is a modern computer with Windows 10 and a good webcam. Probably, the first version of the program will not be ideal, we will try to improve it, transfer it to a mobile phone as soon as possible. But I am sure that this first version is also needed by people, it alone will make sure that they are doing well and do not need to worry. After testing, others will understand that they should not be delayed, but that they should immediately consult a doctor.

Everyone should do their own thing and actively respond to modern challenges. We hope that vibraimage technology will become a barrier to the coronavirus and will unite all people waiting help using a simple and affordable computer program. To wish good health, one must learn to measure its level. Now everyone can do it with HealthTest. A brief description of the program is available on the Psymaker and Elsys website.

Be healthy! Take care of yourself and loved ones.

Viktor Minkin
CEO Elsys Corp
March 21, 2020

1.1 Basic applications

Software HealthTest is designed to determine the level of human health and is suitable for you if you want:

understand whether the patient has a disease or pathology;

objectively compare the health status of several people;

estimate the number of connections between the physiological systems of a person;

assess the balance of human movement activity;

make psychophysiological testing of human health.

1.2 Computer and Camera Requirements

1.2.1 Basic parameters

- Resolution, TVL, more than   400
- Noise level of vibraimage, bit, less than   0,1
- Frame speed, FPS, not less than   25

1.2.2 Digital (web) camera requirements

- Resolution, pixel, more than   640 x 480
- USB compatible   USB 2.0, USB 3.0
- Frame speed, FPS, more than   25
- Exposition control   automatic and manual
- Color mode   Black-white mode
- Flicker mode   Flicker 50 Hz and 60 Hz

1.2.3 System requirements for computer

- Operation System   Windows 10 or later 64-bit only
- Processor   Intel I5 or higher
- RAM   more than 4 Gb
- HDD   more than 100 Mb free space
- USB port   1 free USB ports version USB 2.0
- Video capture   WDM-compatible video device

1.3 Requirements for a relative position of a person and a camera

The basis of the HealthTest program is vibraimage technology which can provide a high-quality result only by analyzing high-quality video. To do this, you must fulfill all requirements of paragraph 1.2.2, 1.2.3. As well as to meet the requirements of paragraph 1.2.1 it is necessary:

1 the tested person to sit in front of a camera and without leaning on the elbows, neck, back and head

2 fix the camera (on the monitor, on the tripod, etc.) in front of the tested person

3 face lighting should be uniform

4 the camera should be focused on the person's face

Fig. 1.1 shows the ideal position of a person in front of the camera, and fig. 1.2 – the ideal image of the person in the frame.
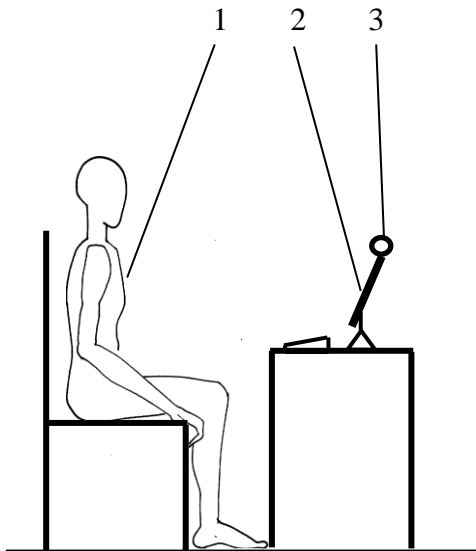
*Fig. 1.1 Ideal test conditions*   *Fig. 1.2 Ideal image of the person in the frame*

For convenience, you can enable the Automatic video quality test in the settings section (see section 4.4), then an assessment as a percentage of video quality will appear on the left side of the program.
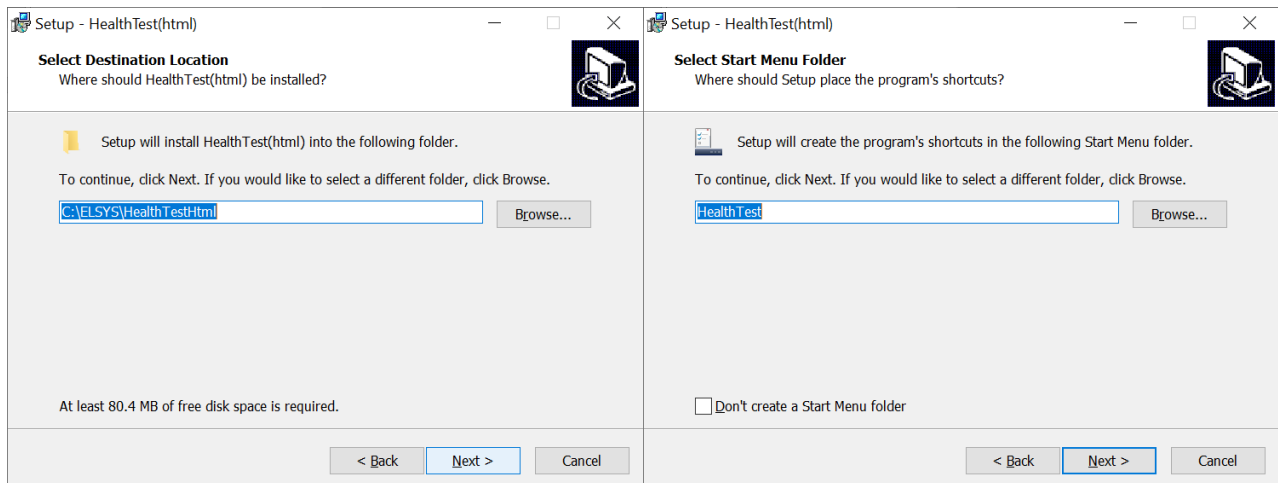
2 HealthTest software installation

Follow steps below for HealthTest installation:

1 Go to Web page http://psymaker.com/ru/shop/ht/healthtest/ and download **setupHealthTest.exe** by link **Download the program** (fig. 2.1).
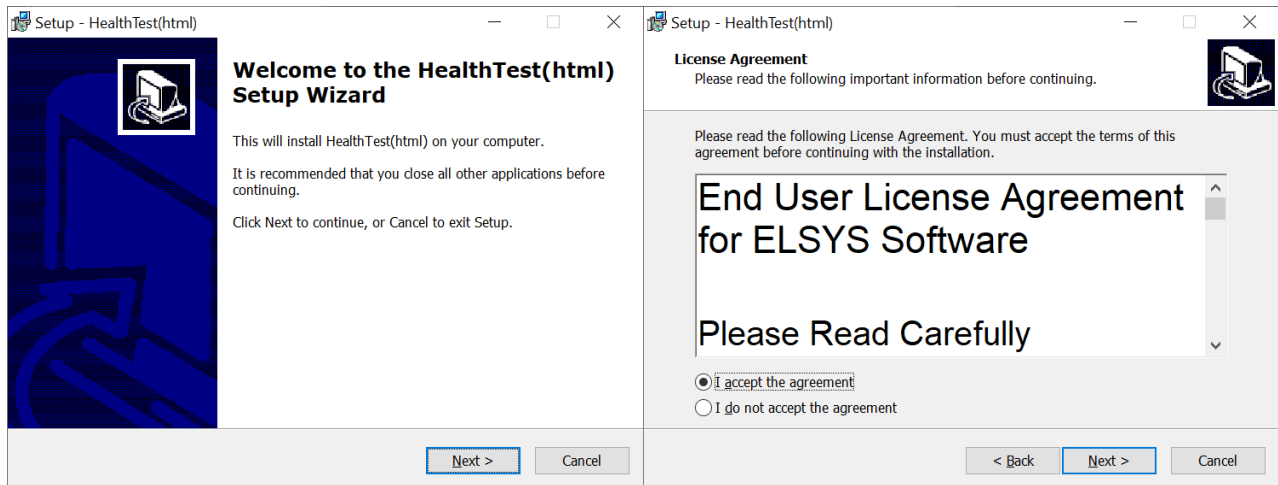
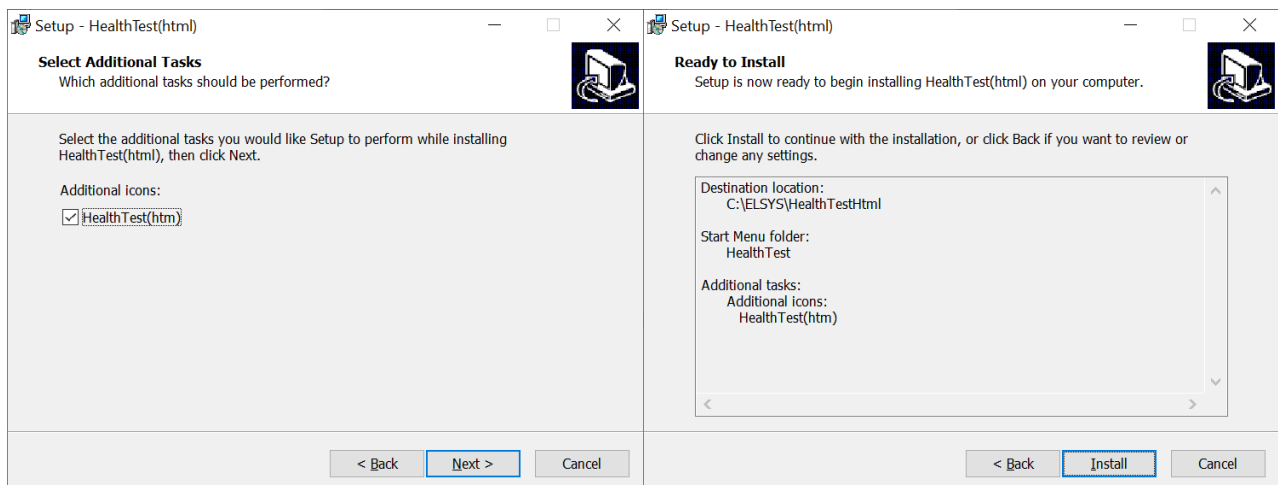*Step 4 of installing*   *Step 5 of installing*

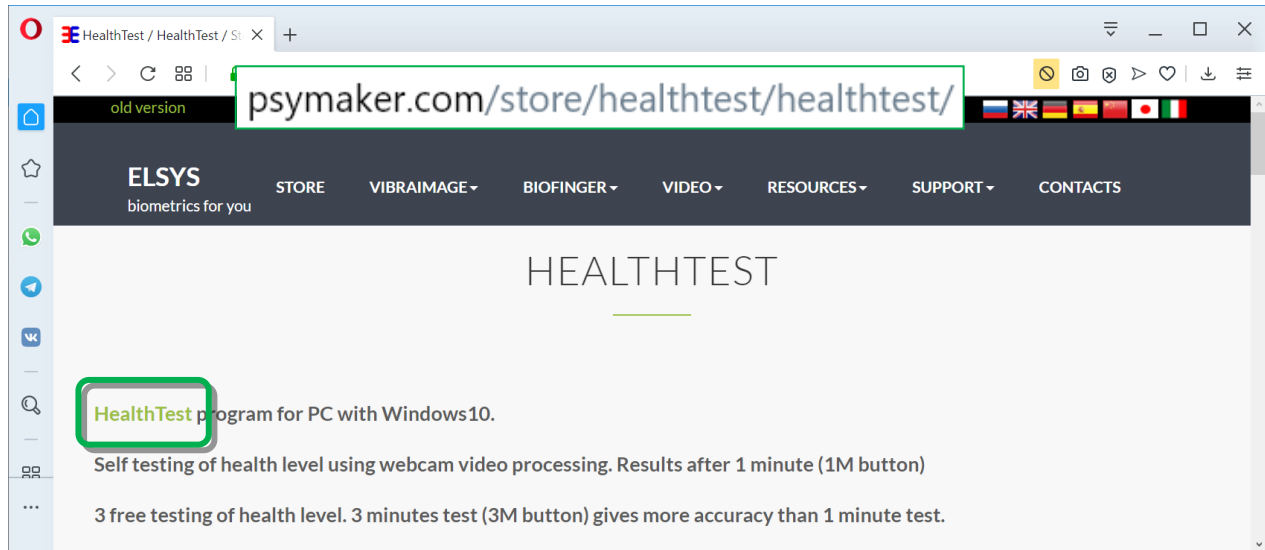*Step 6 of installing*   *Step 7 of installing*
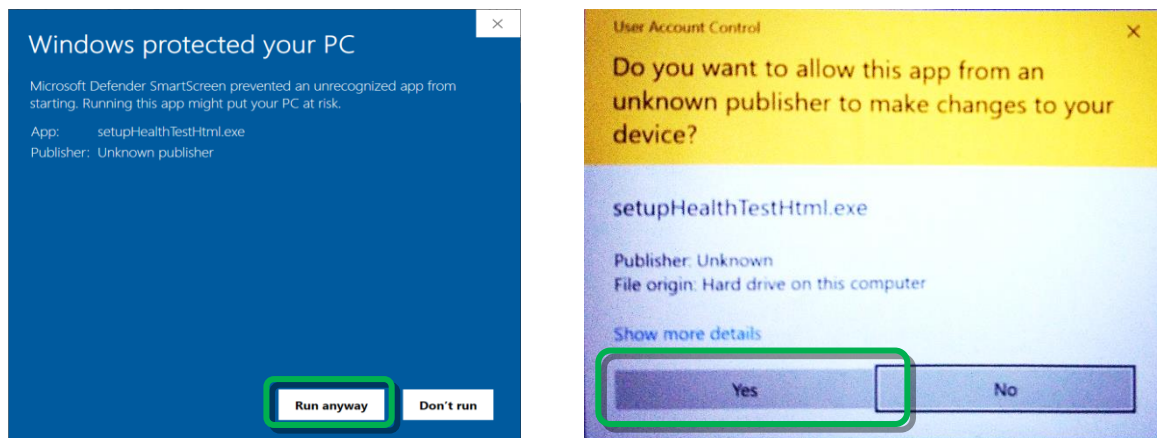
Step 8 of installing   *Step 9 of installing*

Fig. 2.3 Steps 4 – 9 of installing the program HealthTest

Fig. 2.1 Loading HealthTest

2 Run file **HealthTest.exe**. If there is a window with a request for permission to install, click Run or "Yes".

Fig. 2.2 Permissions to install

3 Choose language for installation procedure.

4 Click "Next" in the appeared window of the beginning installation.

5 Accept the license agreement and to click "Next" in the appeared window.

6 In the appeared window, specify a way to the catalogue where files of the program will be written down, then to click "Next".

7 Click "Next" in the appeared window, allows installation of software files on your computer.

8 Selecting an additional icon allows you to display the icon on the desktop (Fig. 2.3).

9 Click "Install" at the start of installation (Fig. 2.3).

10 To successfully complete the installation, do not click "Cancel". After the installation is completed, to click "Finish" in the appeared window (Fig. 2.4).
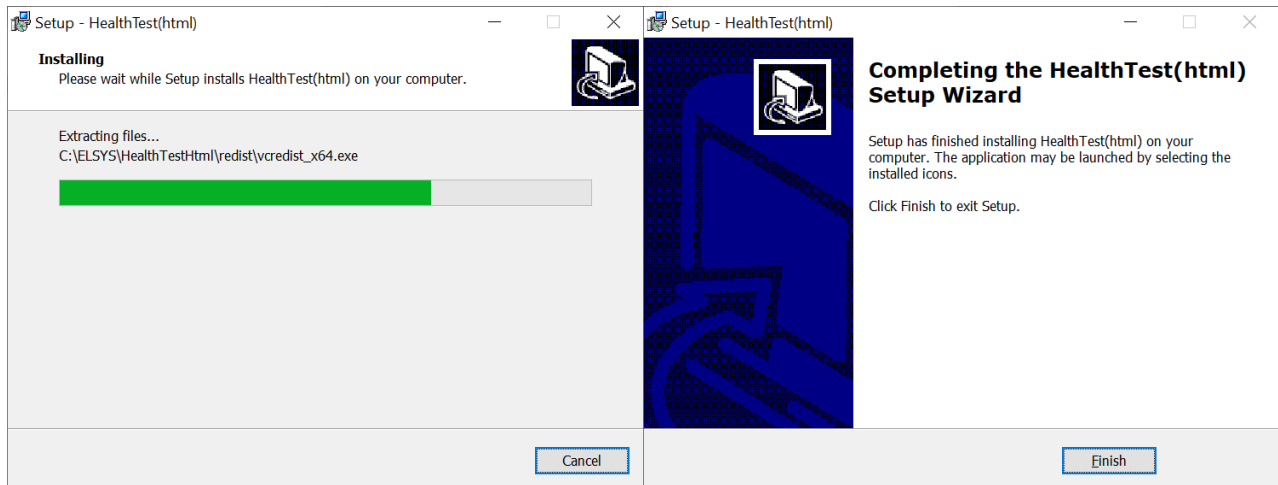
Fig. 2.4 Completing installation

11 After successful installation HealthTest shortcuts will appear in the menu system and on the desktop of your computer.

12 Reboot a computer

13 Check the connection between computer and camera and run the program.

The first 3 times HealthTest starts in DEMO mode and does not require activation, but requires Internet access to check your license.

14 To work with the program more than 3 times, you must activate it (see section 2.1)

2.1 HealthTest software activation

1 Activation procedure requests access to the Internet for receiving answer code from server.

2 Procedure of activation is done once at the first start of the program.

3 Before the program activation it is need to buy this version of the program in the online store Psymaker http://psymaker.com/store/healthtest/healthtest/

4 Activation code has the structure «VI10_xxxxxx_Test».

5 Run the program HealthTest to start activation.

6 At the first start of the program the activation window will be displayed (Fig. 2.5).
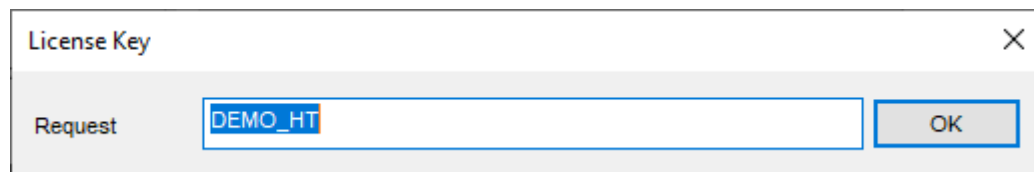

Fig. 2.5 Activation window

7 In the field «Request» it is necessary to enter the activation code received by e-mail or specified by the seller and click «OK».

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8   The activation code will be checked up through the Internet and, in case of successful end of activation procedure program will start automatically.
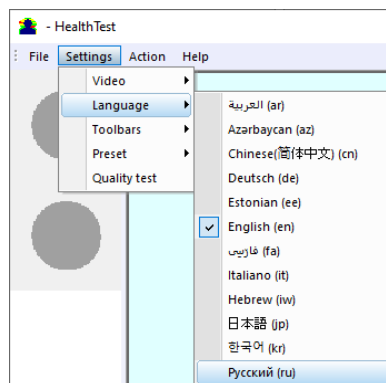
3 First start

1   After successful activation of the program at the first start, if you are not connected to a camera, you will see the program window shown on Fig. 2.9.
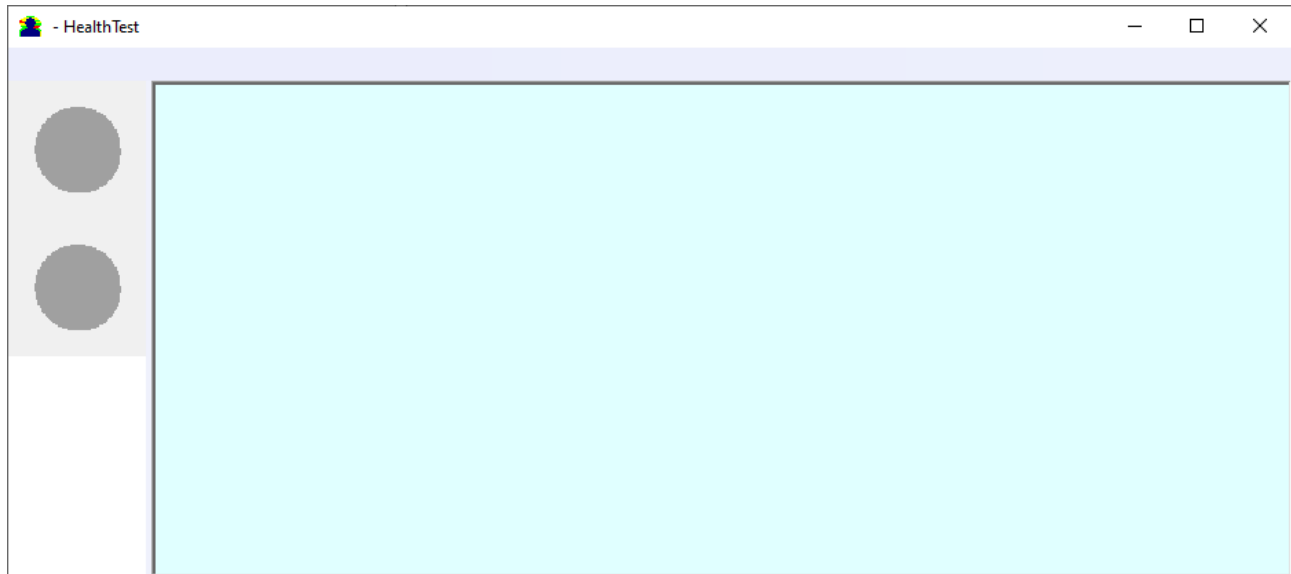
Fig. 2.8 First start

2   Move the cursor to the upper left corner of the program and in the pop-up menu "**Settings**" => "**Language**" select the desired program language (Fig. 2.9). By default, it is English.

Fig. 2.9 Select language

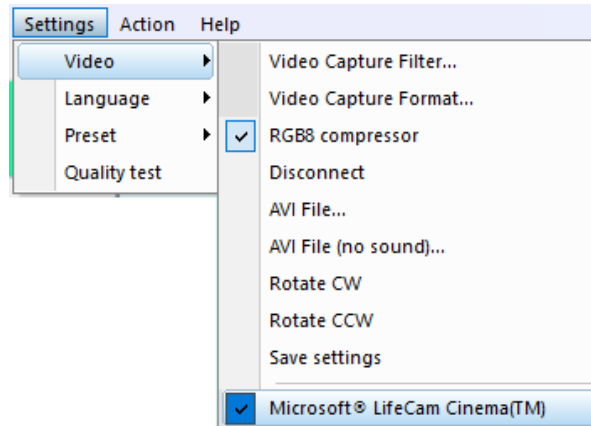3   Select a camera in the pop-up menu "**Settings**" => "**Video**" (on a Fig. 2.10 – Microsoft Lifecam Cinema).

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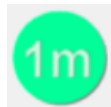
Fig. 2.10 Selecting a camera

If the program does not see your camera, check the connection of the camera to the computer. After selecting a camera, an image will appear on the screen.

4   Set the camera parameters (see. Section 4.2).

5   Check video quality (see. Section 4.4). It should be more than 80%, that is, the column on the left side of the program should be green and, if necessary, eliminate the causes of low-quality video (1-5 errors).
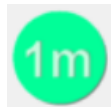
6   Press button to test during 1 min. To increase measurement accuracy press button
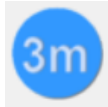
 to test during 3 min.

7   The program will automatically close after completing the measurement in DEMO mode, when activated using the Internet key, the program will not be closed.

8   After the measurement results will be automatically opened (Fig. 2.11).

Personal indicators			
	Indicator (norm)		
Health	$\Sigma[R] = 31.96$ (>20.00)	The number of correlations between physiological systems	The bigger, the better
	$\Sigma[\Delta M] = 1.69$ (<4.00)	Balance of human movements	The less, the better

We reccomend to take the measurement in the 3M mode if you have yellow or red indicator in 1M mode

Explanation of indicators	
Both indicators are normal (green)	No critical diseases / pathologies
One indicator is normal (green), one with deviations (red)	Pathologies are possible (we recommend to consult a doctor)
Both indicators with deviations (red)	We recommend to consult a doctor

Fig. 2.11 Healthy person test results

9   Analyze result. See more in section 6.

4 Video setting

4.1 Select camera

Move the cursor on the upper left corner of the program and call pop-up main menu. Choose there «**Settings**» => «**Video**» => «**.../used camera name/...**». If the camera is connected, selected and operated, 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"**.

4.2 Camera settings (Filter video)

Select "**Video capture filter...**" in the submenu "**Video**"(Fig. 2.11). Item "**Video capture filter**" appears in the menu only in case of the correct installation of camera drivers and correct choice of operating camera.
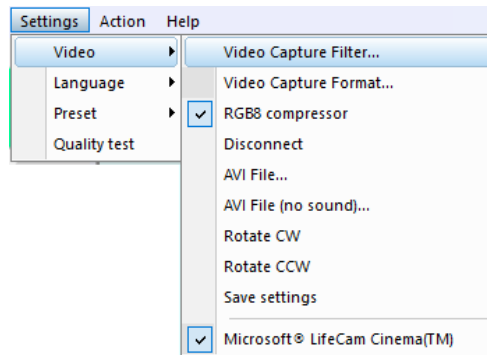

Fig. 2.11 Открытие меню настроек видеокамеры

After a choice of the "**Video capture filter…"** the window "**Settings**" will open. Settings window differs depends on camera type. Figure 2.12 shows the "Properties" window for the Microsoft LifeCam Cinema.
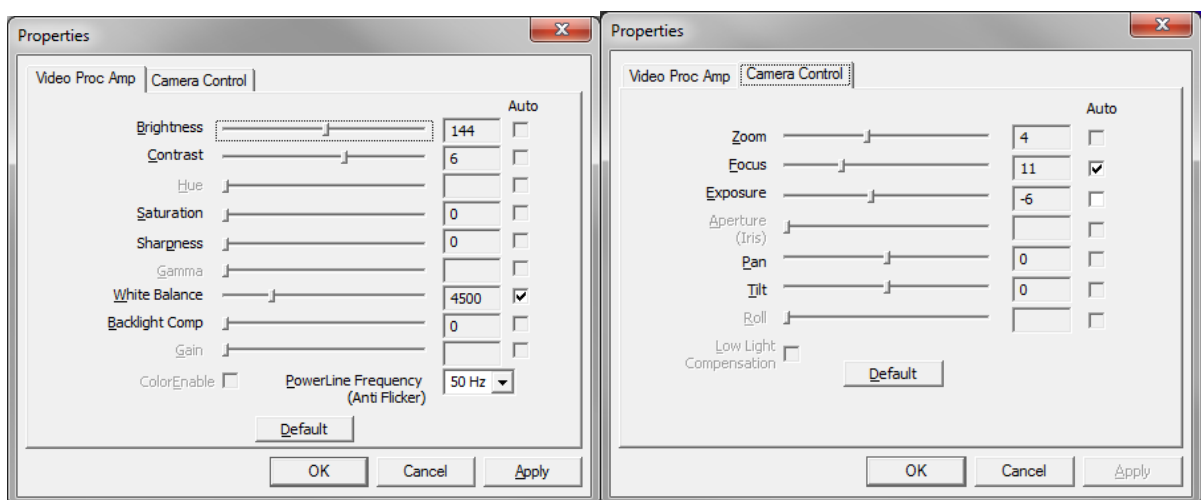

Fig. 2.12. Windows with settings for «Microsoft LifeCam Cinema»

- 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.

4.3 Video capture format

Для открытия окна настроек записи видео необходимо в подменю «**Видео**» выбрать пункт «**Формат записи видео…**» (Fig. 2.13). Пункт «**Формат записи видео…**» появляется в меню только при правильной установке драйверов камеры и выбора рабочей камеры. Частоту кадров необходимо установить 30, а размер кадра («**Размер на выходе**») 640 х 480 элементов (Fig. 2.14).
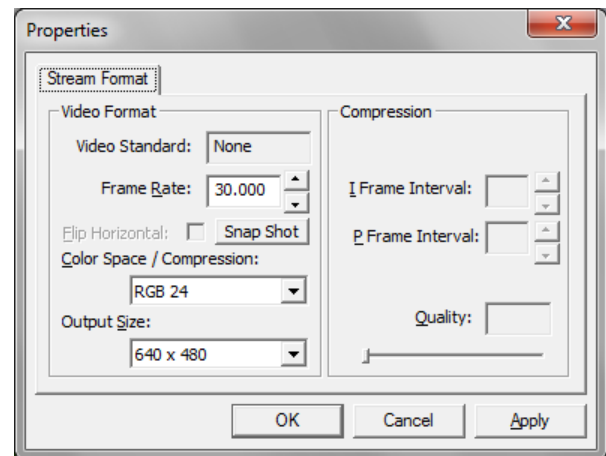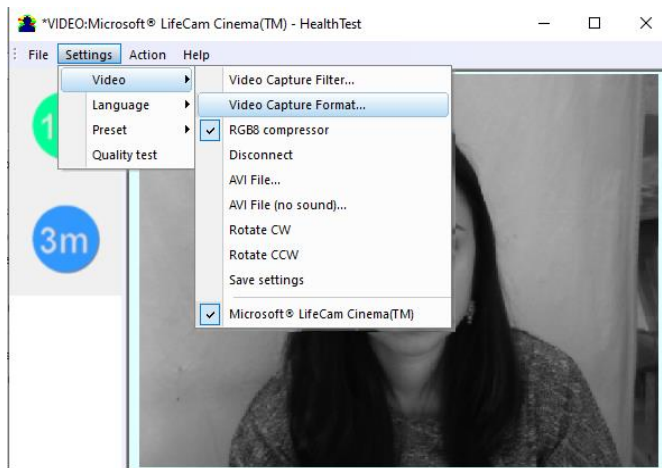

Fig. 2.14. Opening window «Video capture format»   *Fig. 2.15. Window «Video capture format»*

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

4.4 Automatic quality test

The HealthTest program has built-in automatic quality control function image quality control during the test. Since the calculation of human reaction using the video image, the quality control for the processed video is necessary to obtain a correct test result. Error message and the low quality of video will appear on top of the **QT** column on the left side of the program (Fig. 2.16), but only if the **"Quality test"** mode in pop-up menu "Settings" is switch on.

If the quality test is enabled, the final result will appear only if there is no video error message for more than 80% of the measurement time.
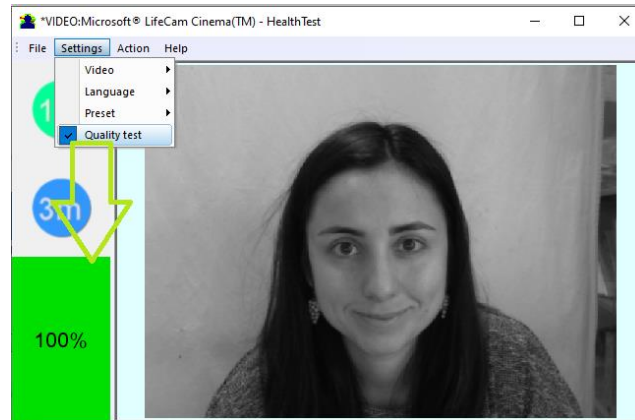
Fig. 2.16. Switch on "Quality test"

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

- **Error 1** – indicates when facial image is lower than necessary. For cancel this error is need to move checked person closer to camera or start zoom function on camera. (Fig. 2.17).

Fig. 2.17. Error 1 at the low video quality. Checking the cause is convenient in AR mode.

- **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. 2.18).
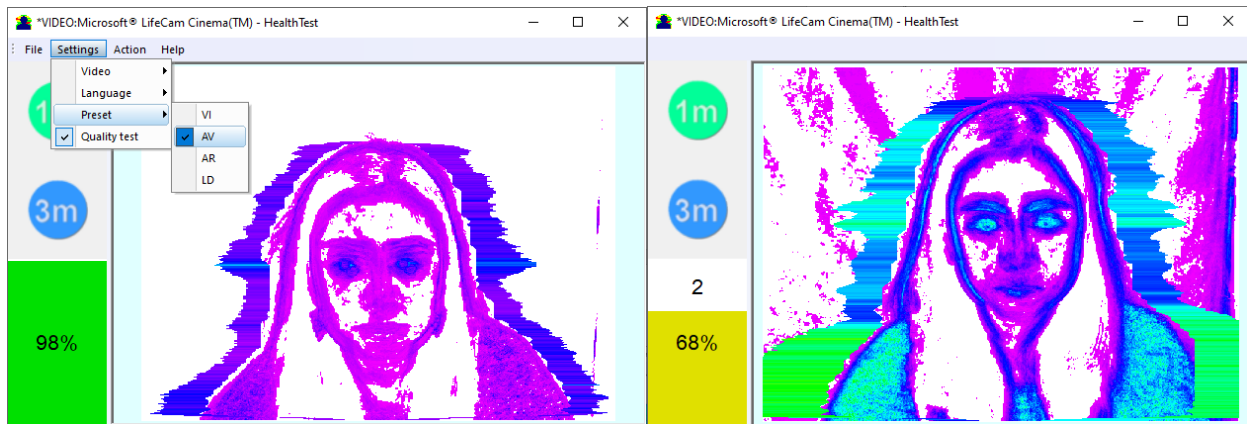
Fig. 2.18. Error 2 at the low video quality. Checking the cause is convenient in AV mode.
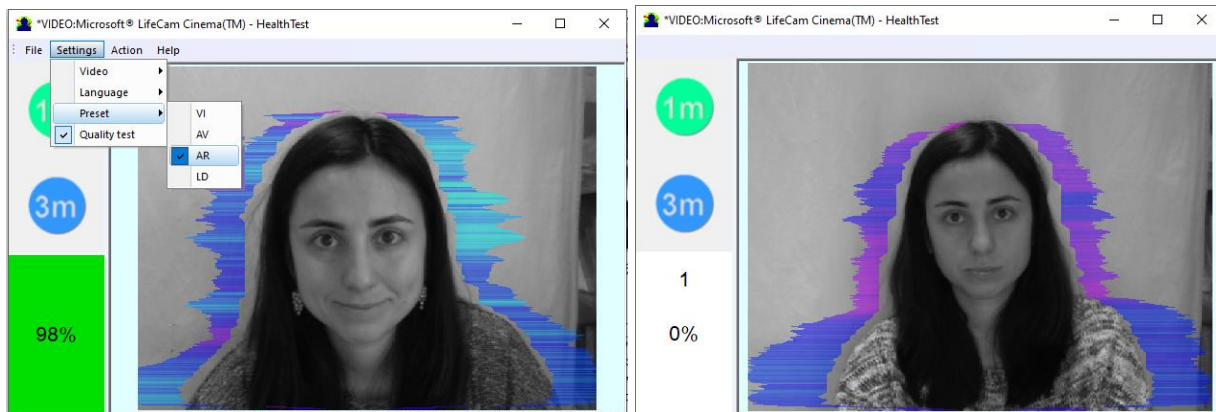
- **Error 3** – indicates when computer input frame rate is lower than necessary. Requested norm for processed frame rate is more than 25 f/s. This errors indication was done for deleting unqualified staff influence during results control. If the actual input speed is less than 25, then the program will show error 3 (Fig. 2.19).

Fig. 2.19. Error 3 at the low video quality. Checking the cause is convenient in AR mode.

- **Error 4** –error-contrast image (Fig. 2.20).

Fig. 2.20. Error 4 at the low video quality. Checking the cause is convenient in AR mode.
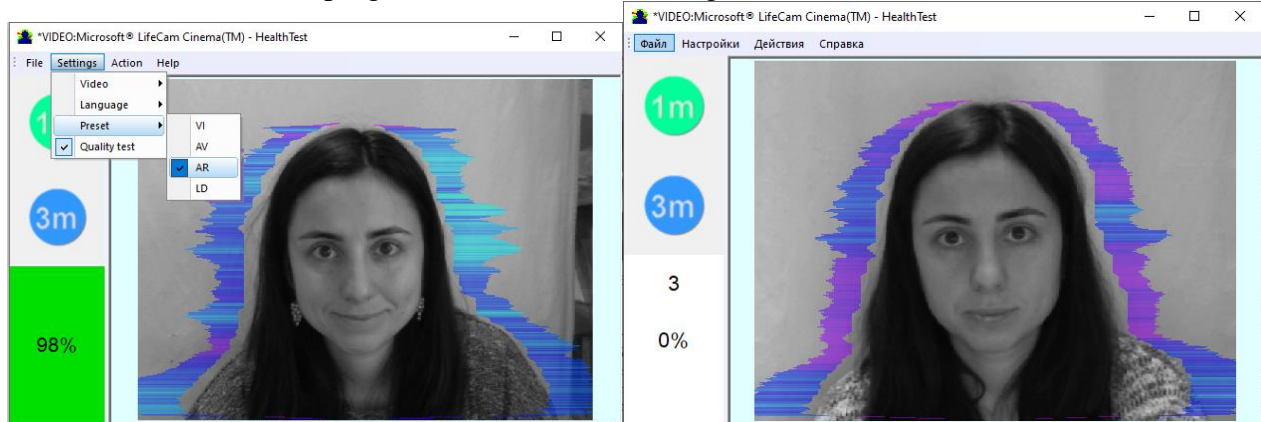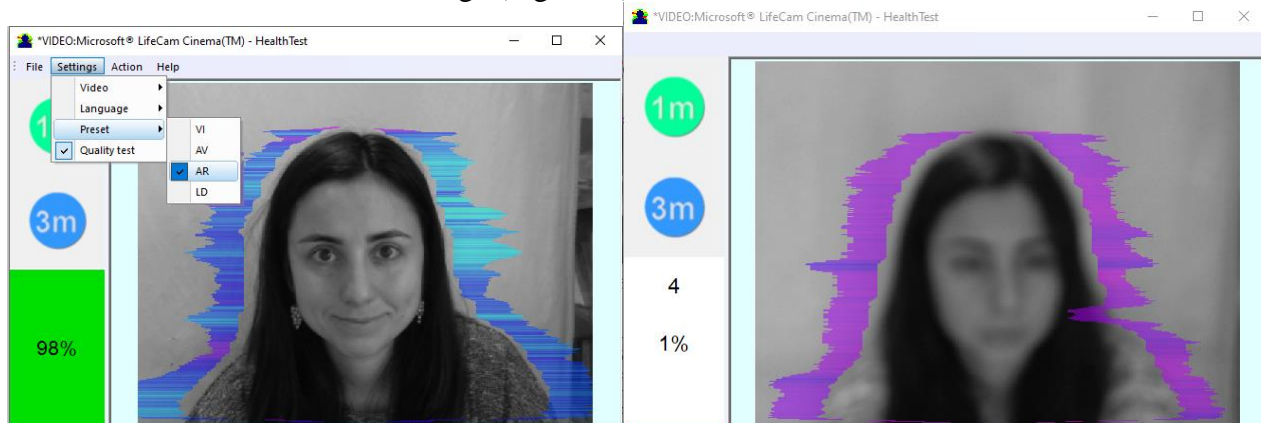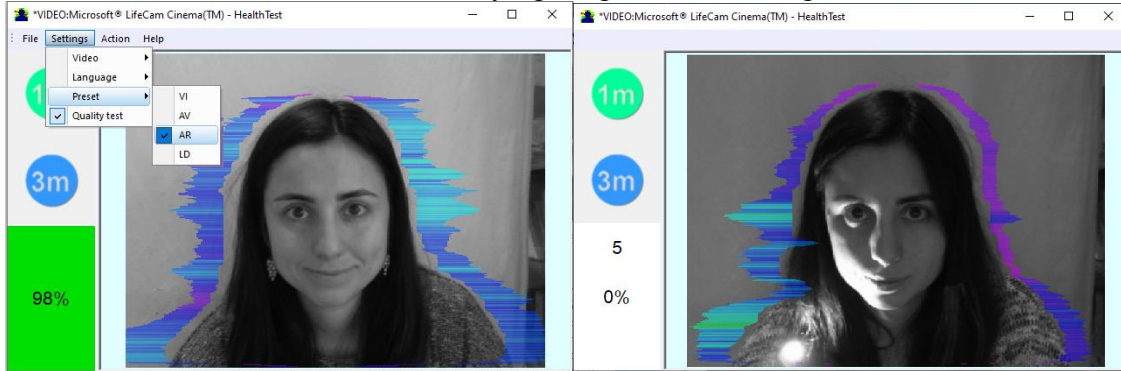
- **Error 5** – due to nonuniformity lighting of the face (Fig. 2.21).

Fig. 2.21. Error 5 at the low video quality. Checking the cause is convenient in AR mode.

Error 1

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

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

Error 2

Temporary noise signal from the video camera includes a video camera noise and illumination instability and can significantly affect the test results. In this case, at the slightest noise level exceeds the specified threshold, the system automatically displays an error message (2) in "QT" column. Also it can mean lack of illumination face.

Error 3

Despite the fact that the television camera may transmit to 30 frame/sec with the set resolution, it does not guarantee that the computer receives and processes the incoming video data in real time. And any deviation from the information processing in real time resulting in a loss of information and hence reduce the reliability of the test. By reducing the actual input frames frequencies and processing frequencies below the set limit, the system automatically displays a warning error (3). To fix the error, reduce the Zoom of the camera, if you used it to increase the size of the face. Check the processor load of your computer, close the resource-intensive programs. Also it can mean lack of illumination face.

Error 4

t occurs with uneven illumination of a person's face. For example, light falls on the side. Try turning the test person to the light or changing the angle of incidence of the light from the lamp. Also occurs if the test person is at an angle to the camera.

Error 5

It occurs if the image is not contrasty, for example, when the camera is not properly focused. To fix the cause of the error manually or automatically adjust the focus of the camera.

Note, before the start of the test should ensure that the program processed the image of a human WITHOUT ERRORS or disable the quality test.

5 HealthTest. Users manual

After starting the HealthTest program video images from camera or video file are displayed in basic window.

5.1 Basic window

In heading of the basic window the following information is indicated (Fig. 3.1):
- type of video source: Video camera or AVI file;
- model of video source: Video camera model or AVI file name;
- name of the program.
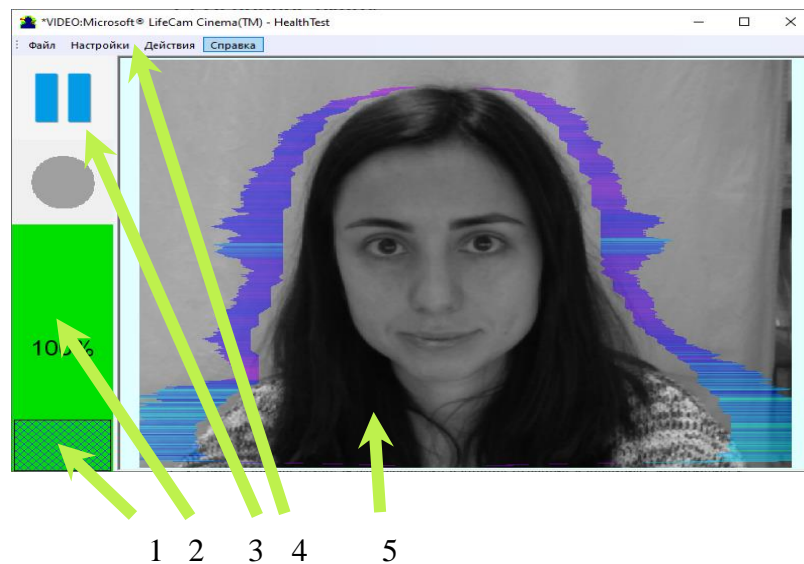
Fig. 5.1. Basic window HealthTest

1. Test time indicator;
2. Video quality test column;
3. Toolbar – main toolbar;
4. File, Settings, Action, Help – Pop-up main menu;
5. Image window for image output in modes VI, AV, AR, LD.

Note, double-clicking with the left mouse button in the image area **resets** all accumulated information about the inter-frame difference and starts a new cycle of data accumulation.

5.2 Main pop-up menu

The main menu contains the following items:
- **"File"**
- **"Settings"**
- **"Action"**
- **"Help"**

5.2.1 Menu "File"

"**File**" menu contains an item "**Exit**" is intended to exit the program.

5.2.2 Menu "Settings"

Menu "**Settings**" (fig. 5.2) contains the following items:
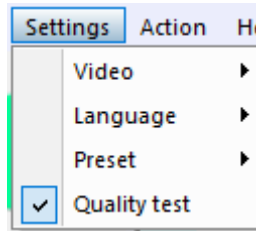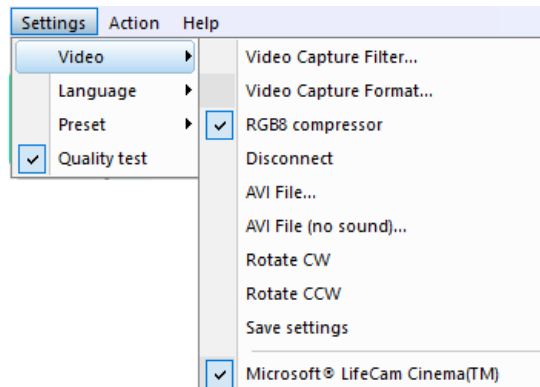

Fig. 5.2 Menu "Settings"

5.2.2.1 Submenu "Video"

Submenu "**Video**" contains commands for selecting and setting the video input (Fig. 5.3).

Fig. 5.3 Submenu "Video"

Subitem **"Video Capture Filter…"** – opens the window of video device setting (contrast, exposition, and brightness). Each device has the especial window of settings.

Subitem **"Video Capture Format…"** – change video capture format.

The 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.

The subitem **"Disconnect"** allows disconnecting all video camera or video file.

Subitems "**AVI File…**" and "**AVI File (no sound)…**" select 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 VibraImagePro.

Subitem "**Save Settings**" allows to save your camera settings if the video conditions don't change otherwise program settings will set by default at each new turn on the camera.

The bottom menu items allows you to select the used video capture device from several installed on this computer.

5.2.2.2 Submenu «Preset»

Submenu «**Preset**» defines the type of the display image (fig. 5.4).

- In **«VI»** mode [«VibraImage mode»] displays vibraimage of person. Color for every image pixel depends on its amplitude or frequency of vibrations (fig. 5.4a).
- In **«AV»** mode [«Aura - Vibraimage mode»] the contour of the object allocated around the vibraimage. Vibra-aura line size depends on medium line vibration amplitude. Vibra-aura line color depends on maximum line vibration frequency inside vibraimage contour (fig. 5.4b).
- In **«AR»** mode [«Aura on the Real image»] the vibra-aura of the person is shown around his real image (fig. 5.4c).
- In **«LD»** mode [«Lie Detector mode»] image area shows real object image (fig. 5.4d).

5.4a Mode VI
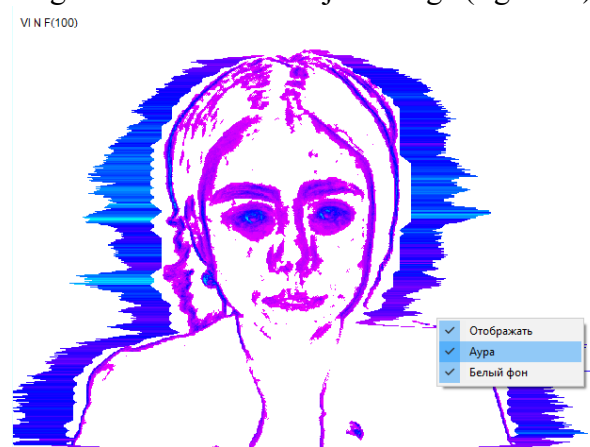
5.4b Mode AV

5.4c Mode AR   5.4d Mode LD

5.4 Image area in different modes

5.2.4 Menu "Action"

Menu **"Action"** (fig. 5.5) contains following items:
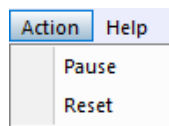
Fig. 5.5. Menu "Action"

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

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

5.2.4 Menu "Help"

Menu **"Help"** (Fig. 5.6) contains item «**About HealthTest…**»:
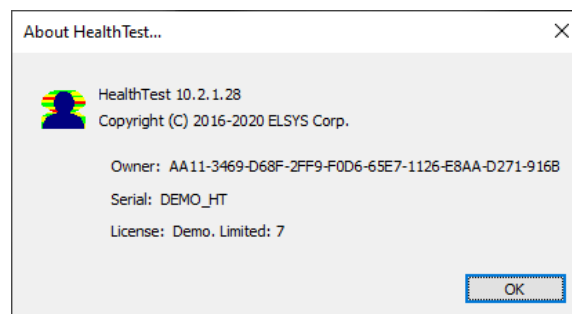
Fig. 5.6 Information window « About HealthTest …»

The License section indicates that the version is the Demo and the number of remaining launches, in this case 9.

5.3 Toolbar

The HealthTest toolbar is displayed on Fig. 5.7.
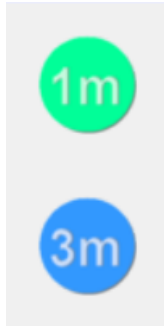
5.7a Before measurement   *5.7b During measurement*
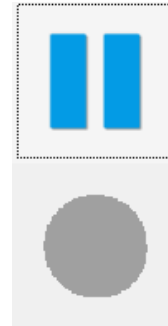
Fig. 5.7 HealthTest toolbar

Before measuring, the toolbar displays buttons and to test during 1 min and 3 min accordingly.

One button "Pause" works during testing to stop test.

6 HealthTest How to save and analyze results

After the measurement results will be automatically opened (Fig. 6.1).

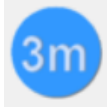| Personal indicators				
	Indicator (norm)			
Health	$\Sigma[R] = 31.96\ (>20.00)$		The number of correlations between physiological systems	The bigger, the better
	$\Sigma[\Delta M] = 1.69\ (<4.00)$		Balance of human movements	The less, the better

We reccomend to take the measurement in the 3M mode if you have yellow or red indicator in 1M mode

Explanation of indicators	
Both indicators are normal (green)	No critical diseases / pathologies
One indicator is normal (green), one with deviations (red)	Pathologies are possible (we recommend to consult a doctor)
Both indicators with deviations (red)	We recommend to consult a doctor

*Fig. 6.1 Result **HEALTHY***

1 If both indicators are normal and displayed in a green cell (Fig. 6.1), then in general we can conclude that there are no diseases or pathologies critical for a person.

		Indicator (norm)
Health		$\Sigma[R] = 25,92\ (>20,0)$
		$\Sigma[\Delta M] = 5,32\ (<4,0)$

*Fig. 6.2 Result **RECOMMEND TO CONSULT A DOCTOR***

2 If one of the indicators deviates from the norm (Fig. 6.2), to increase the accuracy of the result, testing should be carried out for 3 minutes.

If the result is repeated, this may mean an implicit balance of physiological, including vestibular-reflex, human systems, the absence of the necessary degree of correlation between the calculated parameters, the lack of balance of human movements (too strong fluctuations) or insufficient number of connections between the physiological systems of the person for normal functioning of the body.

The reason for this may be a violation of the normal functioning of any physiological or psycho-emotional system in the body, and in this case, we *RECOMMEND* you *TO CONSULT A DOCTOR* to accurately identify the disease.

3 If the Health cell is red and both indicators are not normal we *RECOMMEND* you *TO CONSULT A DOCTOR* to accurately identify the disease.

4 If you see no result at the end of the test (Fig. 6.3), this means a low-quality video in the testing process. To avoid this, during the next test, turn off the automatic "**Quality Test**" in the "**Settings**" menu or improve the video quality by following the tips in section 1.3 and 4.4.

Personal indicators		
Indicator (norm)		
Health $\Sigma[R] = 21.16$ (>20.00)	The number of correlations between physiological systems	The bigger, the better
$\Sigma[\Delta M] = 4.79$ (<4.00)	Balance of human movements	The less, the better
Low video quality		
We reccomend to take the measurement in the 3M mode if you have yellow or red indicator in 1M mode		
Explanation of indicators		
Both indicators are normal (green)	No critical diseases / pathologies	
One indicator is normal (green), one with deviations (red)	Pathologies are possible (we recommend to consult a doctor)	
Both indicators with deviations (red)	We recommend to consult a doctor	

Fig. 6.3 Lack of result due to low video quality

7 Warranty

Maintenance service and service regulations of VibraImage 10 system is carried out according to this Manual and instructions of used hardware maintenance (a computer, the camera, etc.).

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