

Suspicious Behavior Detection System

VibraMIX

MANUAL
Version Mobile

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1 Introduction

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

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

1.1 Basic applications

VibraMIX program solves the following targets:

- Suspicious person detection;
- Emotion recognition;
- Monitoring of psychophysiological parameters of a person;
- Video surveillance in real time by vibraimage technology;
- Psychological testing.

1.2 Smartphone requirements

- | | |
|-----------------------------------|------------------------------------|
| • Operation System | Android 6.0 or later |
| • Processor | 600 MHz or better |
| • Internal RAM | 128 Mbyte or better |
| • Installed software | Microsoft Office Excel for Android |
| • Camera | front or/and back |
| • Frame rate, frame/sec, not less | 25 |
| • Internet connection | Access on HTTP protocol |

2 VibraMIX software installation

For VibraMIX program using need to pass registration on vibrabrain.com site. VibraMIX program is free, however the suspicious person detection function is payable.

2.1 How to pay

- 1 Go to Web page http://psymaker.com/store/VibraImage_Mobile/ (fig 2.1).

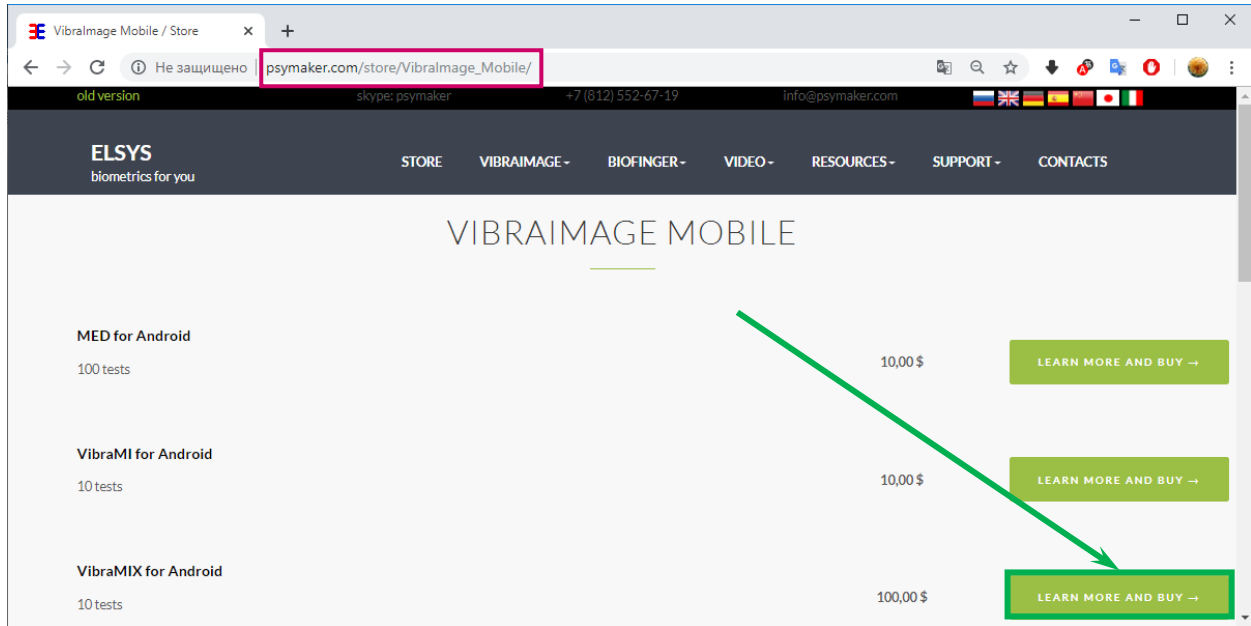


Fig. 2.1 Purchase of VibraMIX for Android

- 2 Press “Learn more and buy” corresponded to VibraMIX for Android (fig 2.1).
- 3 Press buy on the next page

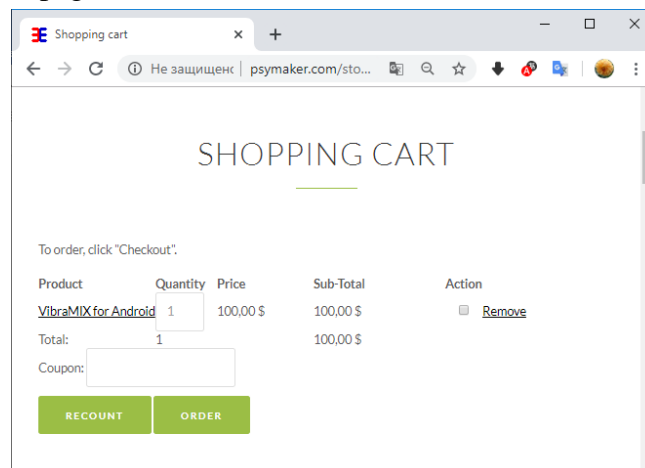


Fig. 2.2 Shopping cart

- 4 Set quantity. To the suspicious person detection 10 times you need to pay 100 \$ (fig 2.2). 1 detected person cost 100 points on your balance on vibrabrain.com or 10 \$. Each 1 \$ means 10 points on your balance. If you want to detect more, for example, 20 times, you should insert 2 to the field “Quantity” and pay 200 \$.
- 5 Insert coupon into the field “Coupon”.
- 6 “Remove” allow you to remove product from your “Shopping cart”.
- 7 Press “Recount”.
- 8 Press “Order”
- 9 Fill the fields on the next page “Delivery Address”. It is important to put in the corresponding field your e-mail. If you have profile on vibrabrain.com put in the same e-mail as in your profile.
- 10 You will see Total price of your purchase. Press “Pay XXX \$”
- 11 Follow payment assist.

After payment user gets a mail with information about the order.

Users with profile on vibrabrain.com have balance increase on corresponding number of points.

Users without profile on vibrabrain.com get login and password automatically with information about the order.

2.2 Registration on vibrabrain.com

To create new profile on vibrabrain.com please follow steps below:

- 1 Go to Web page <http://vibrabrain.com/profile/>
- 2 Follow the link “Register”.
- 3 Create a login (username) and a password and input them into fields. Then press button “Register” (fig 2.3).




Fig. 2.3 Registration on vibrabrain.com

- 4 After successful registration user see “Registration is ready. Now you can sign in.” and you will get your login and password to your email.

BONUS, after successful registration on vibrabrain.com according 2.2 user get 100 bonus points.

After payment

2.2 Download

To download **VibraMIX** please follow steps below:

- 1 Check smartphone connection to Internet
- 2 Go to Web page <http://www.vibrabrain.com/download/> (fig. 2.4) or www.psymaker.com/support/downloads/
- 3 Load file VibraMIX.apk www.psymaker.com/downloads/VibraMIX.apk (fig. 2.4).



Fig. 2.4 Registration on vibrabrain.com

2.3 Installation

To install **VibraMIX** please follow steps below:

- 1 Run file VibraMIX.apk.
on smartphones with app Play Protect after running user see message as shown on fig. 2.5, please press “Accept”.

Turn on Play Protect?

Google Play Protect regularly checks your apps and device for harmful behavior. You will be notified of any security risks found.

Click [here](#) to learn more.

DECLINE ACCEPT

Fig. 2.5 Before installation.

- 2 Answer “Install” to smartphone question and start installation (fig. 2.6).

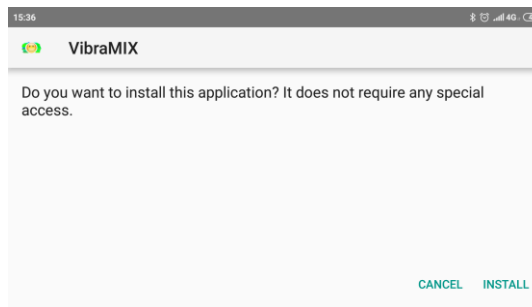


Fig. 2.6 Installation start.

- 3 After you will see process of installation (fig. 2.7)

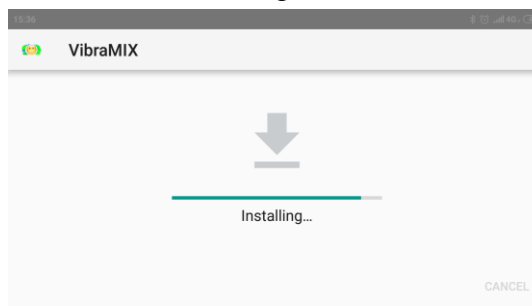


Fig. 2.7 Installation process.

- 4 After successful installation you should press “Open” (fig. 2.8).

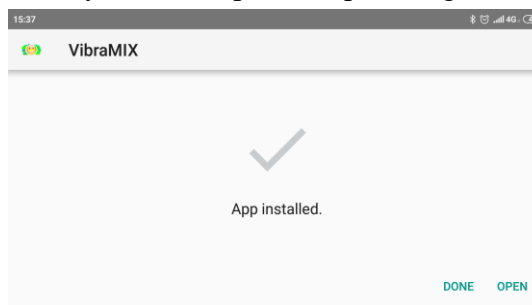


Fig. 2.8 Installation end.

To open program later you should press “Done” and later you should open program by



pictogram VibraMIX on your smartphone.

We recommend this way also if you have any problems with program (for example fig. 2.9).

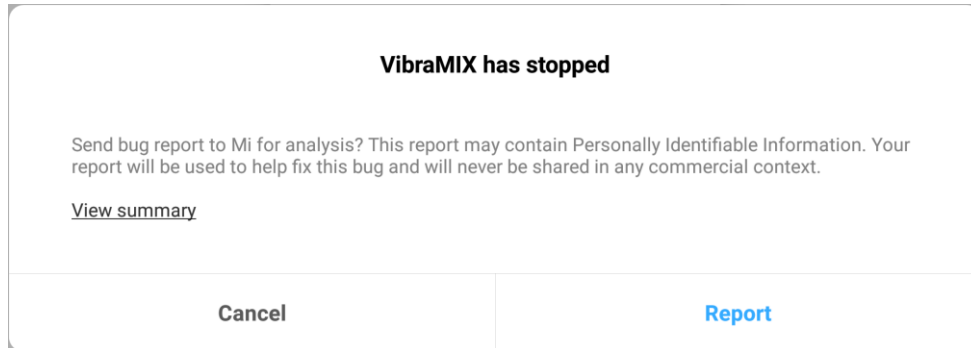


Fig. 2.9 Bag report.

- 5 On first program start you should allow with permissions (fig. 2.10).

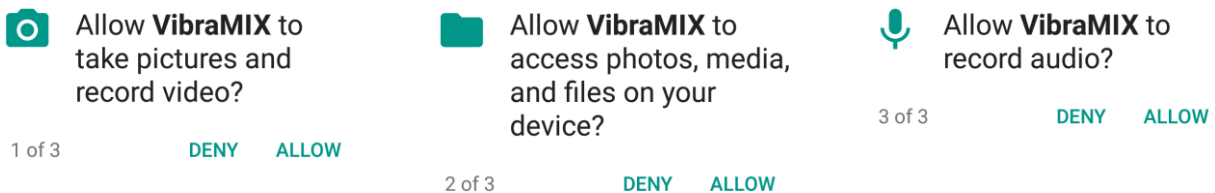


Fig. 2.10 Three permissions for good program process.

- 6 Enter your “Login” and “Password” into appeared window (fig. 2.11) and press “LOGIN”.

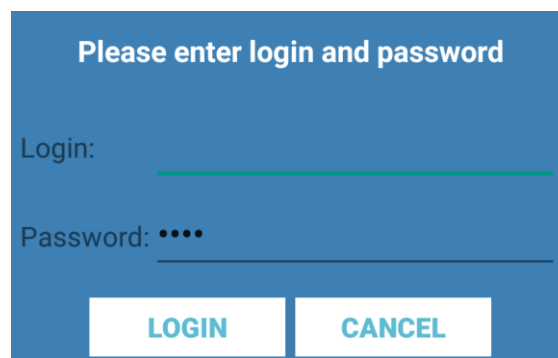


Fig. 2.11 Login window.

- 7 Enjoy VibraMIX.

Note, for deleting errors you should fix the phone, for example, as in the holder for the phone (fig. 2.12). When you place the tripod on a table during measurements, you should not lean or touch the table to reduce external vibrations.



Fig. 2.12 Tripod with phone.

3 VibraMIX. User's manual

After start of VibraMIX in the main window, there is an image from camera.

3.1 Main window

In the main window of the program, you can see an additional six windows that display information about the parameters of mental and emotional state of a person, and program settings (on fig. 3.1 the windows labeled corresponding numbers):

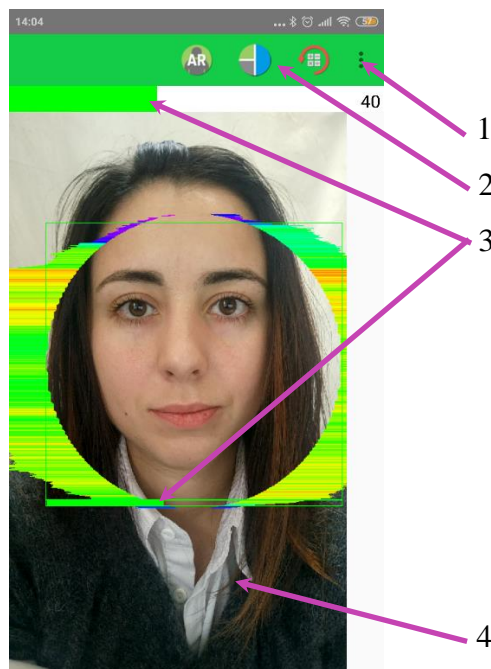


Fig. 3.1 Main window VibraMIX

1. Camera, Preset, View, Settings, Reset – main menu;
2. Toolbar;
3. Suspicious – level of the most suspicious person in the frame;
4. Basic window for: video with vibraimage processing (mode Video)/parameters of video (mode Main)/folder with results on your phone (mode Results).

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

3.2 Main menu

The main menu contains the following items (fig. 3.1):

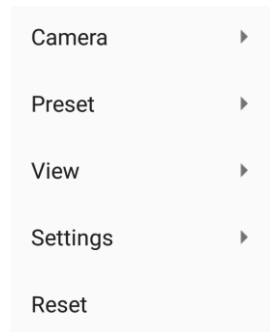


Fig. 3.1 Main menu

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

3.2.1 Submenu «Camera»

Submenu “**Camera**” (fig. 3.2) allows choose back or front camera:

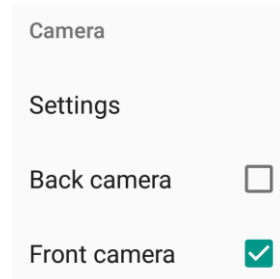


Fig. 3.2. Submenu «Camera»

Submenu “**Camera**” => “**Settings**” allows to block banding of video – item “**Anti banding**” (fig. 3.3) or choose “**Scene mode**” (fig. 3.4).

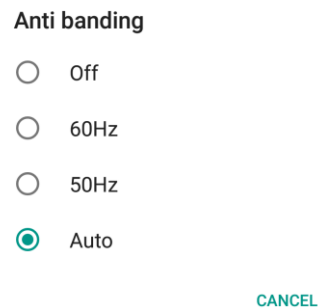


Fig. 3.3. “Anti banding”

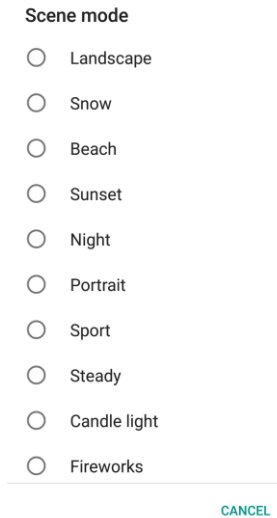
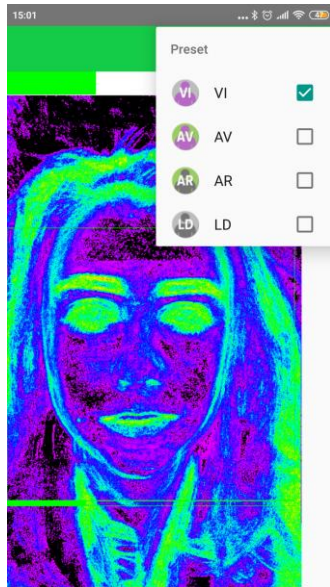


Fig. 3.4 “Scene mode”

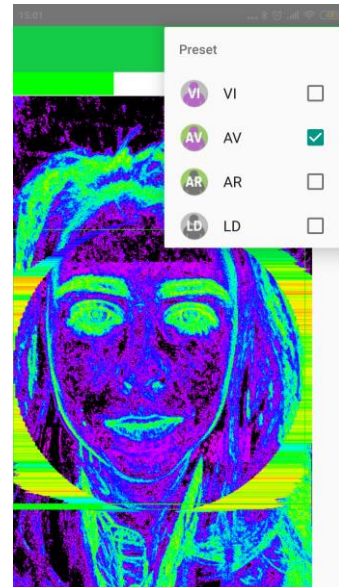
3.2.2 Submenu «Preset»

Submenu «**Preset**» defines the type of the display image (fig. 3.5).

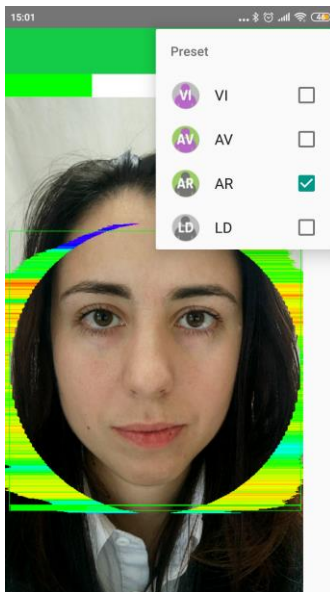
- In «**VI**» mode [«VibraImage mode»] displays vibraimage of person. Color for every image pixel depends on its amplitude or frequency of vibrations (fig. 3.5a).
- In «**AV**» mode [«Aura - Vibraimage mode»] the contour of the object allocated around the vibraimage. Vibra-aura line size depends on medium line vibration amplitude. Vibra-aura line color depends on maximum line vibration frequency inside vibraimage contour (fig. 3.5b).
- In «**AR**» mode [«Aura on the Real image»] the vibra-aura of the person is shown around his real image (fig. 3.5c).
- In «**LD**» mode [«Lie Detector mode»] image area shows real object image (fig. 3.5d).



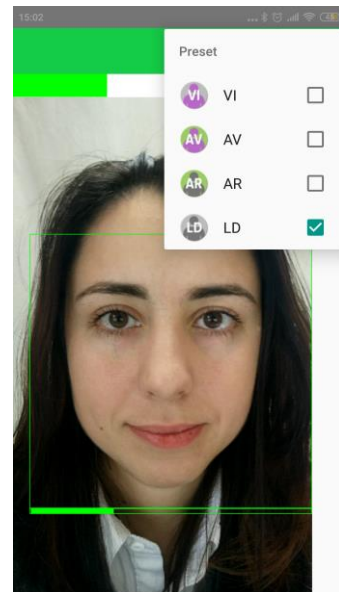
3.5a Режим VI



3.5b Режим AV



3.5c Режим AR



3.5d Режим LD

3.5 Image area in different modes

3.2.3 Submenu «View»

Submenu “**View**” (fig. 3.6) defines visible in the basic window information and contains the following items:

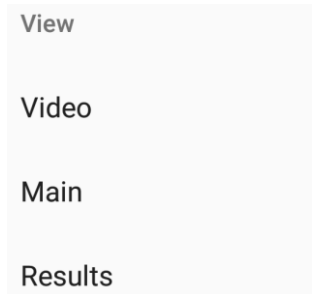


Fig. 3.6. Submenu «View»

Item “**Video**” – displays video from camera in modes (“Preset”) (fig. 3.5).

Item “**Results**” – displays folder on your smartphone with results.

3.2.3.1 Submenu «Main»

Menu «**Main**» - displays information about adjustments of system and results of data vibraimage processing (fig 3.7).

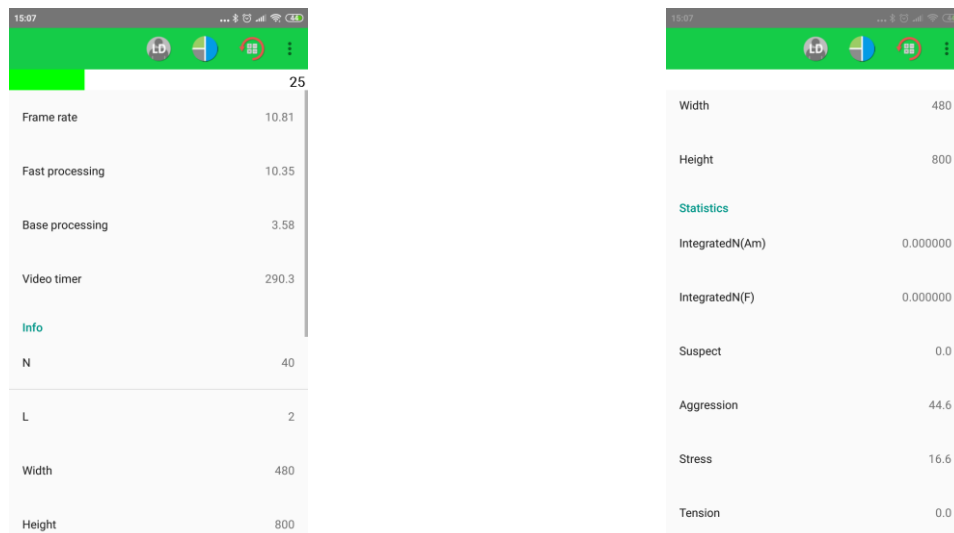


Fig. 3.7. Menu «Main»

- «**Frame rate**» – Number of the frames per second, received from the video source;
- «**Fast processing**» – Maximum number of the processed frames per second used for calculation. Selected by user;
- «**Base processing**» – Number of the processed frames per second used in base algorithm. Selected by user;

- **«Video Timer»** – For camera mode-displays time of supervision. For recorded video - time of current video-file record. For viewing a video-file - time from the file beginning);

Info:

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

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

Statistics:

- **IntegratedN(Am)** – Average frame amplitude vibraimage intensity processed for the N frames;
- **IntegratedN(F)** – Average frame frequency vibraimage intensity processed for the N frames;
- **«Suspect»** – Calculated level of suspect for object in frame;
- **«Aggression»** – Calculated level of anger for object in frame;
- **«Stress»** – Calculated level of stress for object in frame;
- **«Tension»** – Calculated level of tension for object in frame;

3.2.4 Submenu «Settings»

Submenu “**Settings**” (fig. 3.6) allows to set parameters of vibraimage processing and contains the following items:

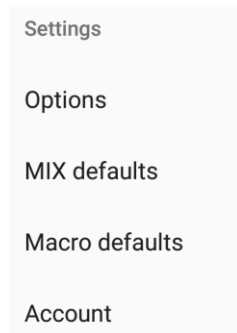


Fig. 3.6. Submenu «View»

Items “**MIX defaults**” and “**Macro defaults**” – load basic MIX and MACRO modes parameters of vibraimage video processing.

Item “**Account**” opens Login window (fig. 2.7).

3.2.4.1 Submenu «Options»

Menu “Options” contains the following items (fig. 3.7):

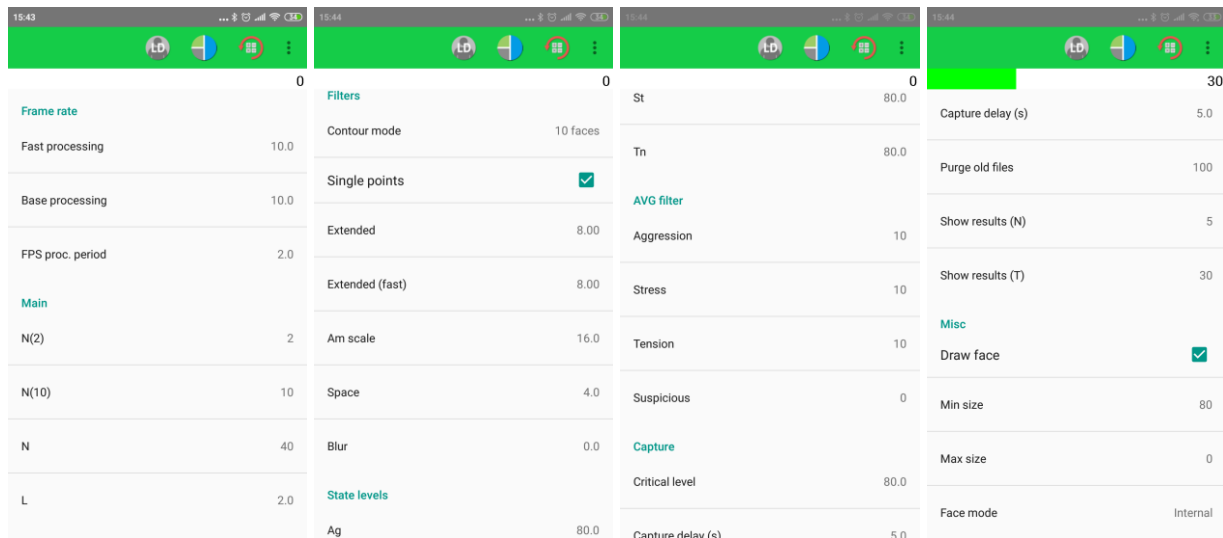


Fig. 3.7. Submenu “Options”

Frame Rate Settings

Fast processing	Frequency (fps) for processing «fast» parameters of vibraimage, noted by a word «fast»
Base processing	Frequency (fps) for processing «base» parameters of vibraimage, noted by a word «base»
FPS proc. period	Frequency of the frames (fps) during calculation period

Main settings

N(2)	Minimum number of accumulated frames. By default, 2
N(10)	Average number of accumulated frames. By default, 10
N	Maximum number of accumulated frames. By default, 100
L	Threshold of a palette. Defines a threshold of displayed image, value of less brightness considers as «black»

Filters

Contour mode	Calculation whole vibraimage (VI), on fixed contour or face only.
Single points	Removes single points, surrounded by black
Extended	It is intended for reduction of noise of a video camera. Delete video noise in bit. This filter is important, when the object is motionless, and values changed because of camera noise.
Extended (fast)	Delete video noise for fast processing.

Am scale	Multiplication factor used for vibraimage visualization in a "amplitude" mode
Space	Reduce vibraimage on borders of motionless contrast objects.
Blur	Blurres video if necessary
State levels Ag, St, Tn	Suspicious level in the Aggression parameters (Ag), «Stress» (St), «Tension» (Tn) is set. When exceeding level of danger the system gives out a sound signal and fixes a frame.
AVG filter	
Aggression	Number of frames for aggression level averaging
Stress	Number of frames for stress level averaging
Tension	Number of frames for tension level averaging
Suspicious	Number of frames for suspect level averaging
Capture	
Critical level %	sets critical (upper) level of emotion parameters for alarm signals
Capture delay (s)	This parameter determines how long (in seconds) the program can not recognize a human face in the frame before you will get an error message
Purge old files	Defines maximum number of result files in folder Results. When this amount is exceeded, older files are deleted.
Show results (N)	The number of captured images shown in basic window
Show results (T) (s)	After this time captured image disappeared from the basic window
Misc	
Draw face	No – not draw rectangle around face, Yes – draw rectangle around more danger single person. For non-danger person rectangle draw green color, but if person suspect level more than «Critical level», than rectangle draw red color.
Min size	Sets in pixels the size of rectangle for search of persons
Max size	
Face mode	Off – switch off/on face detection

3.3 Toolbar

VibraMIX toolbar (fig. 3.8) contains following buttons:



Fig. 3.8 VibraMIX 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.



– choice of video “Preset”.



– external vibraimage (vibra-aura) around real video



image mode (AR), – choice of internal vibraimage mode (VI),



– choice of



external vibraimage (vibra-aura) around internal video image mode (AV), – choice real video image mode (LD);



– opens menu “View”;



– reset all saved up information and statistics about frames and start new cycle collection of information



– open main menu.

4 MIX mode. Suspicious people detection

Mix Mode is similar to both Micro and Macro. Goal of Mix is to take accuracy from Micro and applicability from Macro. Face detection must be enabled in this mode. Vibraimage analysis in Mix mode occurs inside the contour of faces detected by face recognition algorithms. For the face detection is possible to choice in settings the Internal algorithm of mobile phone or Open CV algorithm (if Open CV algorithms are installed on the mobile phone).

With correct settings is possible to achieve minimal error rates as ($8\% < \text{FRR} < 15\%$) in the Mix mode.

Requirements to video in Mix mode:

- People should be in a frame on approximately one place not less than 5 seconds. Better if everybody in line or in crowd goes through the checking place for this purpose.
- Camera must be stable and focused on the place where people stay the longest time (for example in line on the first person).
- Suspect levels are processed for every people with the faces detected in a frame. Without face detection, suspicious person would be miss in Mix mode. For detection of person without visual face image is possible to use Macro mode.

Note. The simple way of adjusting the sensitivity of Suspicious person detection is changing the Critical level in Options. In default settings Critical level sets 60%. For higher sensitivity of suspicious person detection, you need to set Critical level lower, for example 50%. For lower sensitivity of suspicious person detection, you need to set Critical level higher, for example 65% or 70%.

4. 1 Mix mode parameters

After Mix mode start you need to adjust settings based on your object and will see image of persons in frame with aura or without it and suspect lime for every face like on the Fig 4.1.

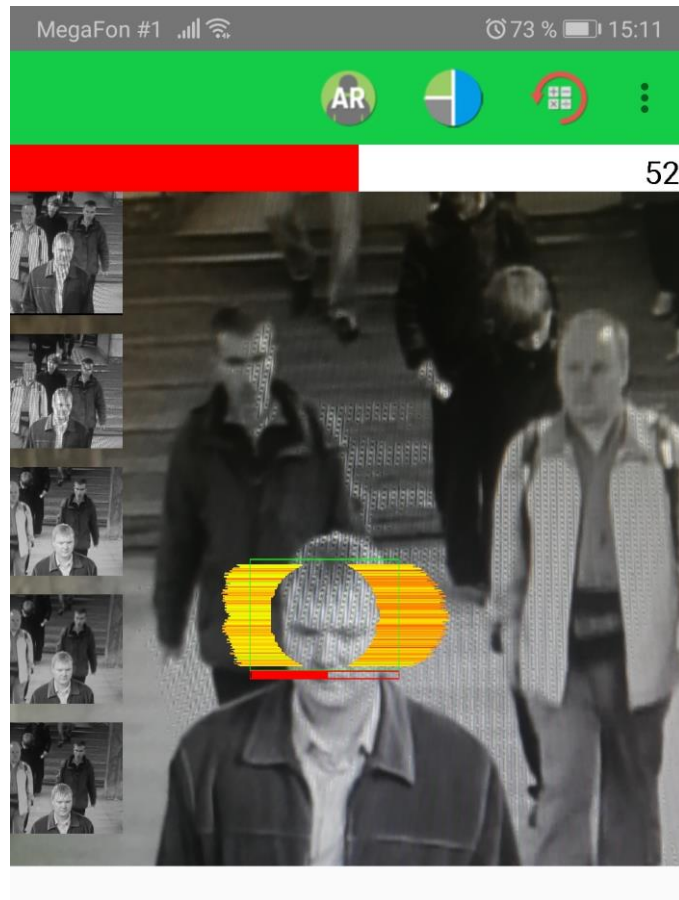


Fig. 4.1 Capturing suspicious person in Mix mode

The person with the suspect level higher than setting critical level is settings displays on the left side of the screen.

Putting to the suspicious person image you can see it one on the screen like Fig. 4.2.

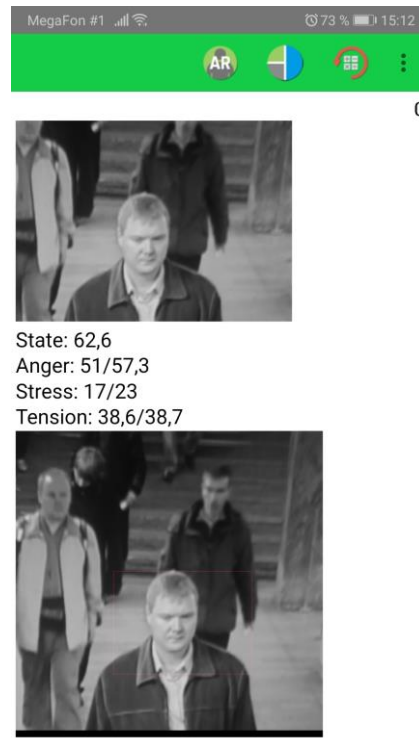


Fig. 4.2 Captured suspicious person with calculated emotional levels

All captured images are placed to the directory Documents/VibraMIX on the phone memory.

5 Warranty

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

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Version Mobile **VibraMIX**

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