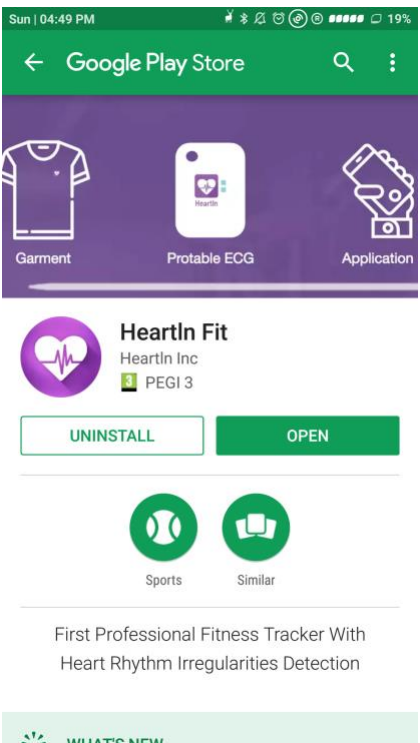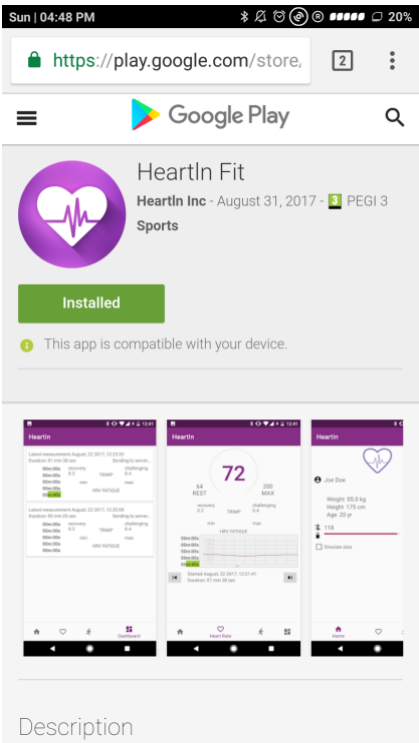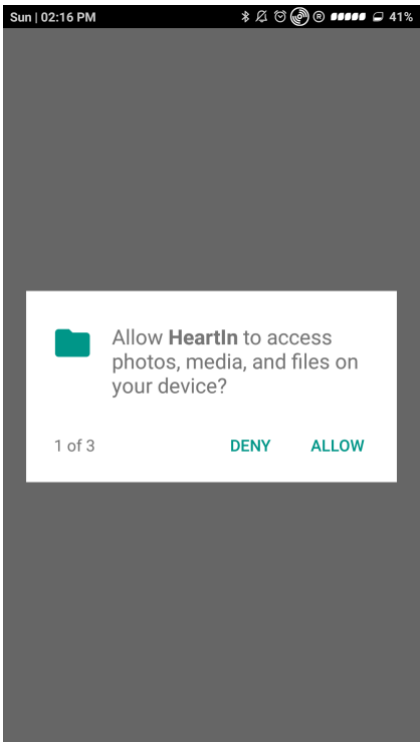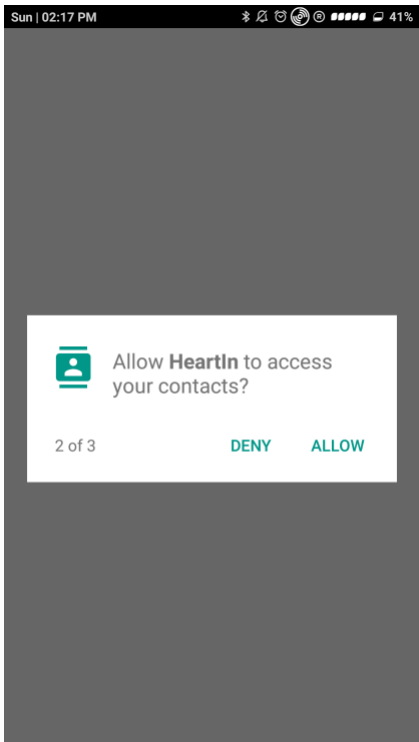# HeartIn "Garment + 1 channel ECG Device" user guide

1. Browse heartin.net/ios or heartin.net/android on your phone, download application (iOS or Android) and start installation process by clicking Install


2. Run the Application. When you run the installed program "HeartIn" on your IPhone you will see Untrusted Enterprise Developer - to continue the startup process:

- press cancel and on your IPhone, go to the "settings", then "general", then "device management" or "profile", pick up the developer of the program IXC Global, (you will see the program "HeartIn" under the

developer), press the button "trust IXC Global Wholesale Inc." and then again press the button "Trust".

- after that we recommend to allow HeartIn App to write and read Health Access data for iOS, and allow to access your contacts and files for Android
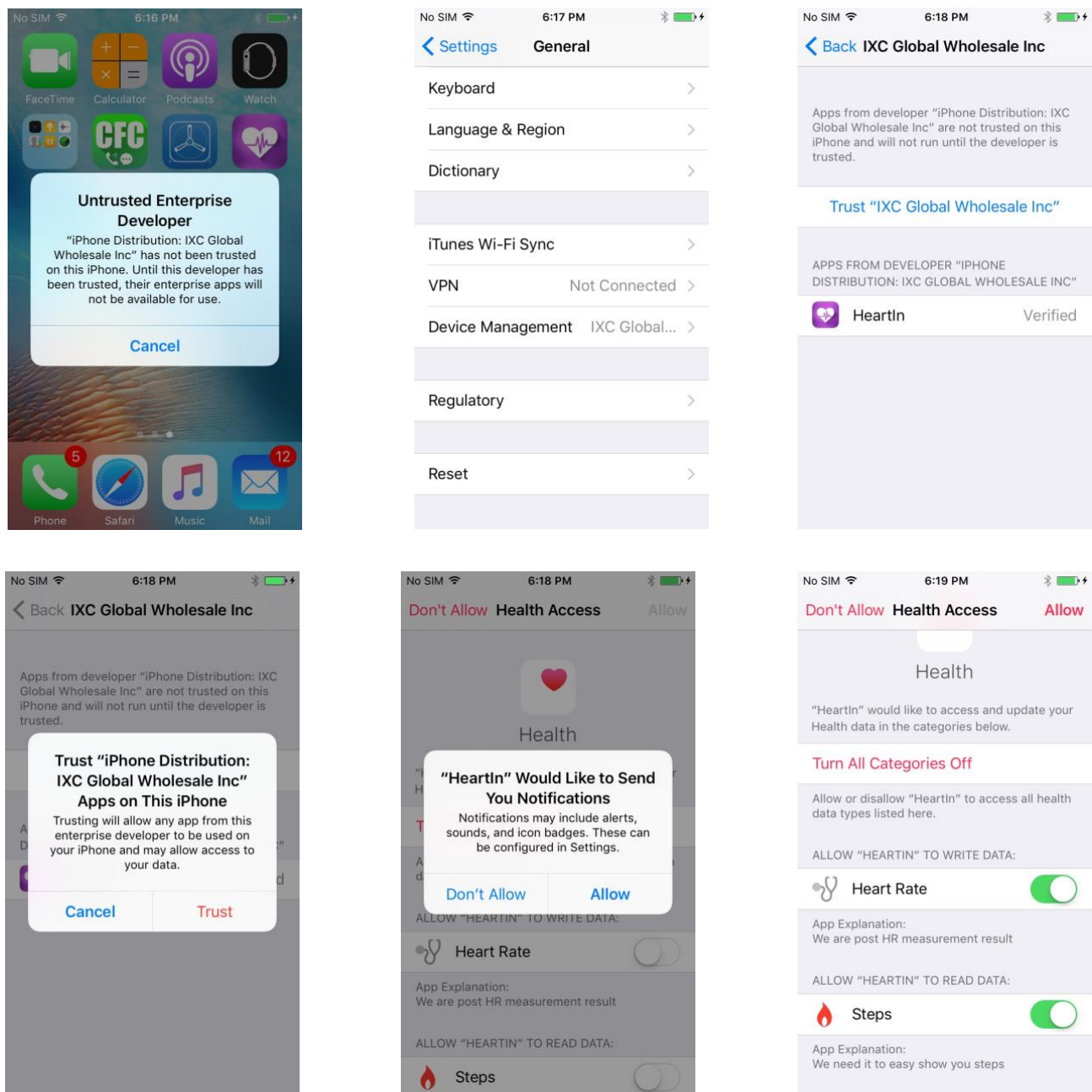
3. Dress the Garment and snap the ECG into the clips on the sleeve of the Garment. **Please note,** that to ensure the reliability clips are fitted as tightly as possible, so the first snapping may require

additional force. Also, be as careful as possible with the first unfastening of the device from the Garment.
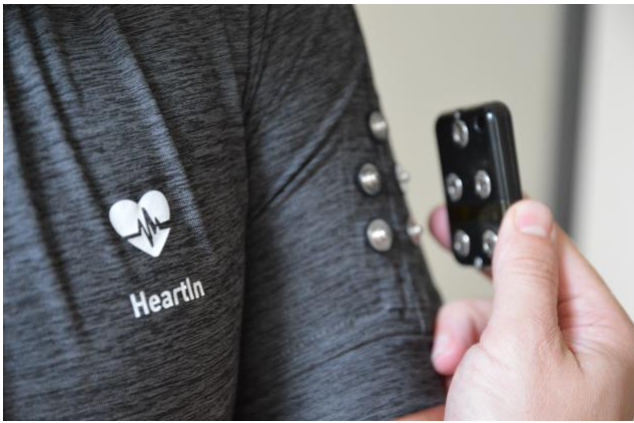
4. Run **"HeartIn App"** on your phone and turn on bluetooth. Sign up or sign in by entering your Login and Password.

Open Profile. **The app automatically finds the ECG device after you switch device On.**
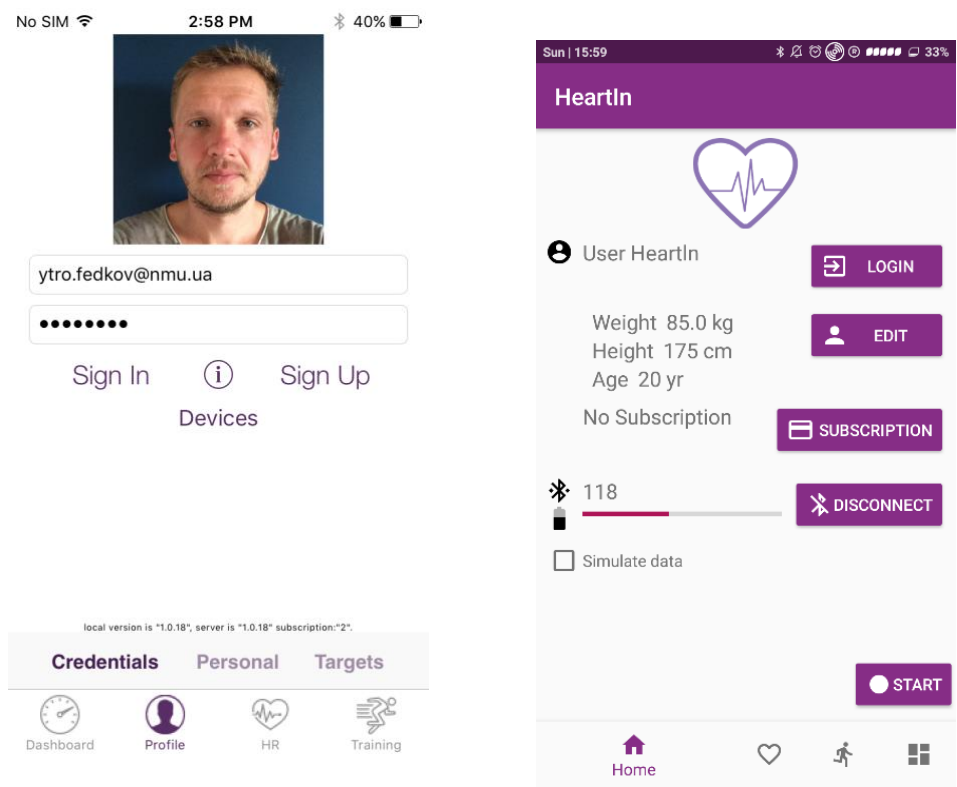
5. Press "**On button**" on the ECG device and hold for 5 seconds until the indicator light blinks blue.

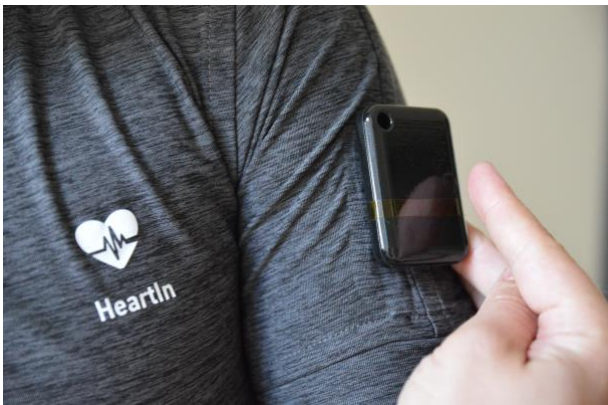6. Choose the icon "**Profile**" to adjust your personal data. Here are 3 main slots (for iOS) and general for Android:

- **Credentials**. After starting ECG device on this screen you can see that device is active – inscriptions "Fit+ and connected" will appear and you should check the battery charge. Also, here you can choose and change your profile photo. You do not need to press Sign In or Sign Up button because you are connected automatically after starting the application.
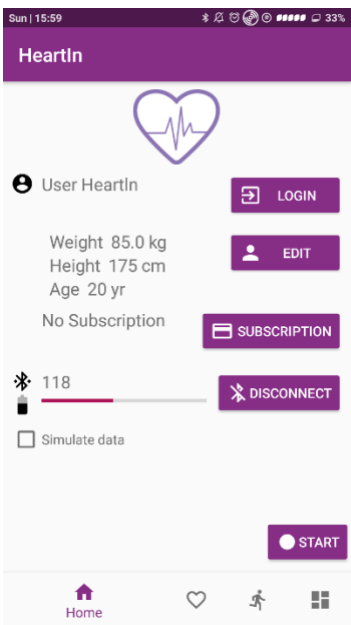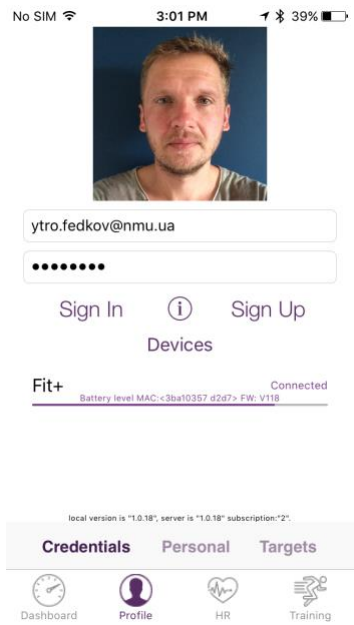
- **Personal**. On this screen, you should fill in your age, gender, weight, and height. These data will be the source of calculating your personal fitness parameters. Besides you can On and Off our Voice

Assistant. Using Voice Assistant you will receive voice prompts considering your targets during the workout.
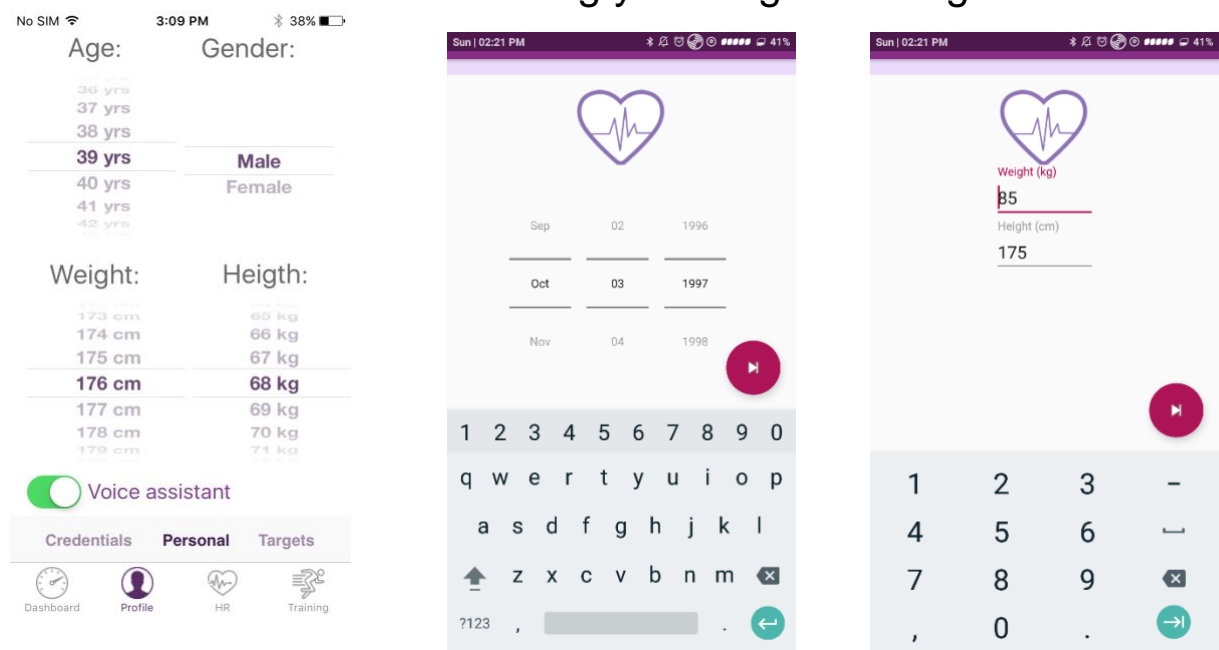
- **Targets.** Adjust different goals you want to gain during training. You can choose a goal according to the total time of training, distance, time in exact TRIMP zone considering the type of activity. For example, you want to be in 3rd TRIMP zone during 30 minutes to 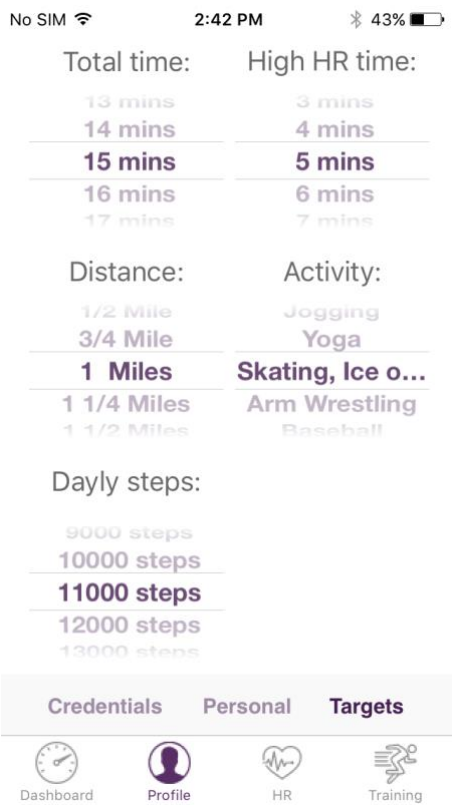increase your stamina. If you are in the 4th or 5th zone for more than 1 minute you receive a voice prompt "You are at the higher zone you choose, decrease your load", and the same for the lower zones - "You are in the lower zone you choose, increase your load". In addition, each minute you will receive a voice information about how long you are in the zone you choose.

After you gain the goal you will hear "Well done, you have reached your time (distance, TRIMP zone) goal". You can also put "the goal for a day" regarding your movements and set up the numbers of steps that should be done by you during a day.

7. Choose the icon **"Exercise"** on your screen. Then press **"Start"**. The measurement starts. You can see an ECG graphic and signal

quality (for workout better to use the mode "Record high and normal quality", that you can choose by switching) on the screen. Several seconds you have to relax and to be in calm mood; for reliable start measurements do not move or speak while the measurement performed. In the tab "Exercise" on the screen a graph of a single-channel ECG is displayed in real time, this is automatically recorded into the phone. Through the "Dashboard" tab, you can view the recordings at any time convenient for you. After a few minutes, the curves of heart rate variability indices will also appear on the screen (*Please, refer to the appendix 1*). Here you can also find a map with your position and route.
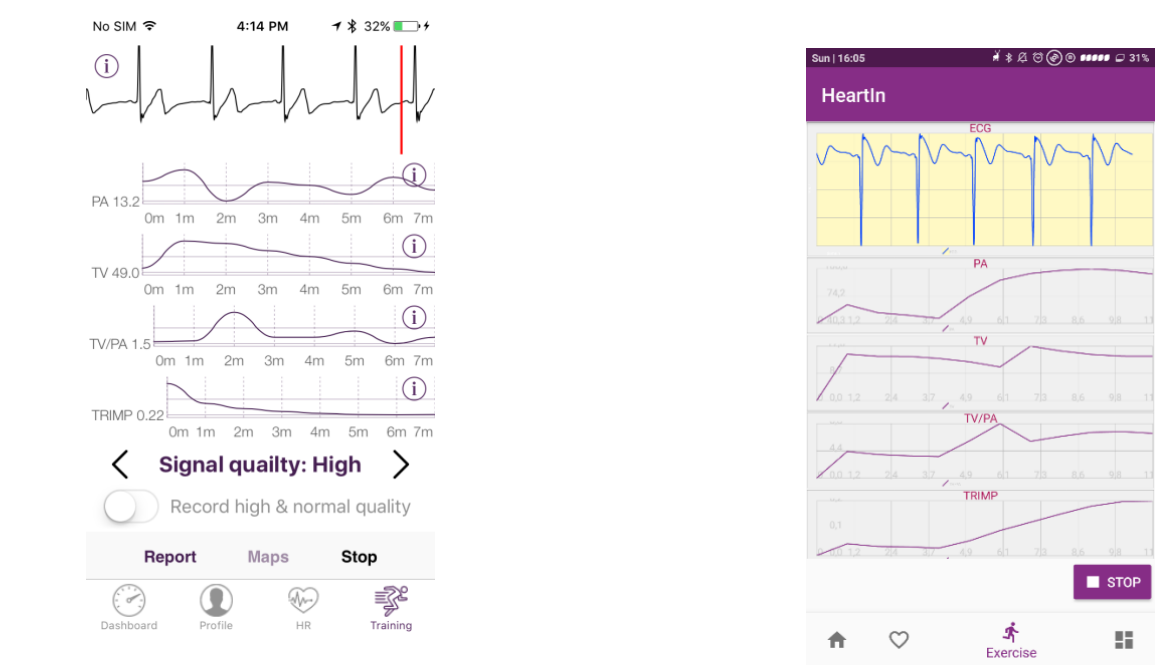
8. After that you can choose the icon "HR" (heart rate).
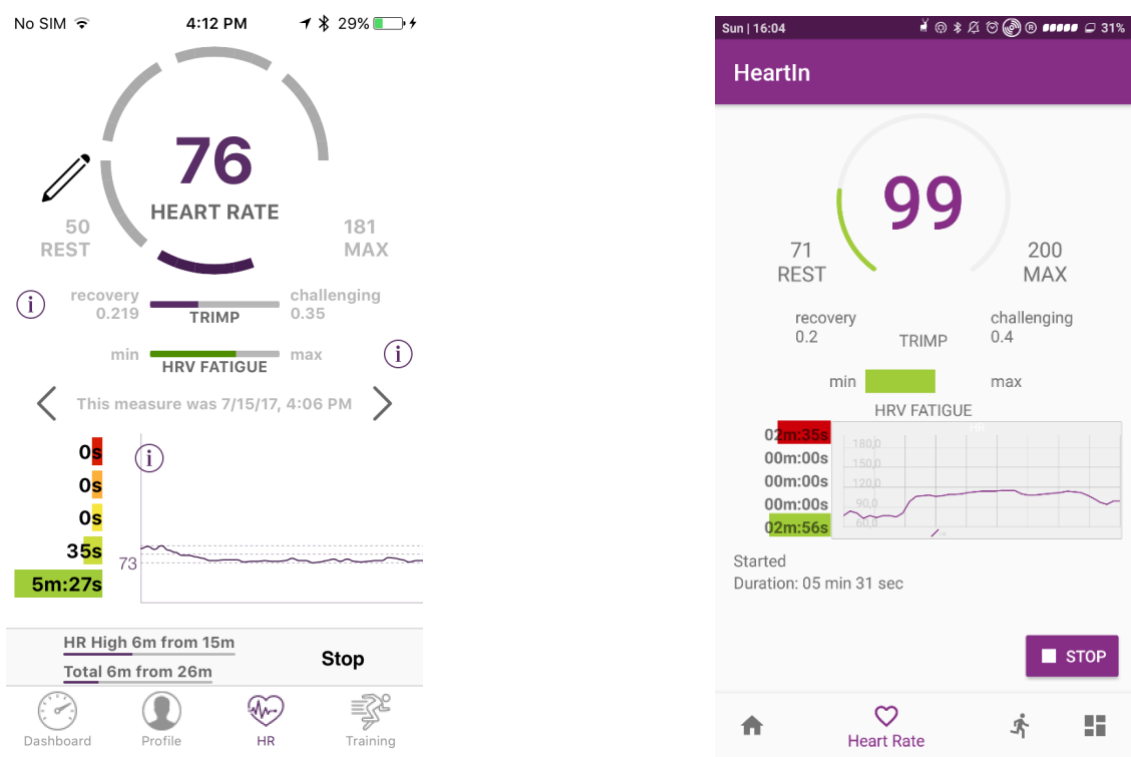
In the "HR" tab, you can check you heart rate, indices of Fatigue and total TRIMP with load distribution during training on the TRIMP zones (*Please,*

refer to the appendix 2). At the lower part of the screen you can see the short information about your goals. For example, "Total 12 m from 30 m".

9. In the "Dashboard" tab, you can select the episode you need and then play it, get a report (forward the report to the doctor, share the data) or go back to the original header on the Dashboard.
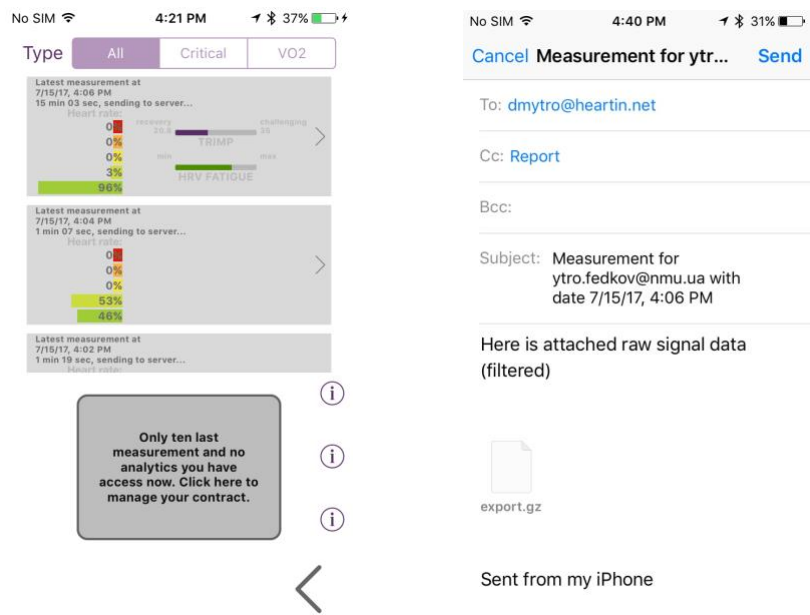
10. After the training charge the 1 channel ECG Device, using USB-cable.
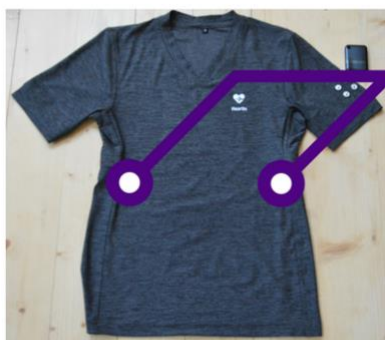
Position of 2 textile electrodes

11. If you have a dry type of skin, to increase signal quality lubricate the textile electrodes on the inner surface of the Garment with a special gel.

Enjoy using the products of Heartln
We will be always glad to help you,
Our contacts: https://www.Heartln.net/index.html
                  e-mail: info@heartin.net
                  tel.: +1(786)5738717
                  Skype: oleksiivinogradov

MONITORING OF THE HRV

Why HRV

Dynamic adjustments in cardiac and peripheral vascular control during exercises include their regulation by the autonomic nervous system (ANS) - sympathetic and vagal (parasympathetic) activities. It occurs in response to rapid changes in heart rate and blood pressure. Analysis of electrocardiographic (ECG) tracings allows the measurement of the ANS. In athletes, HRV monitoring is frequently applied to the prevention and diagnosis of overtraining syndrome, which is associated with numerous symptoms including ANS dysfunction and imbalance.

HRV is an indicator for:

● Fatigue

● Overtraining

● Hydration level

Assessment

HeartIn®FA application will calculate your HRV

parameters automatically.

During training you can see your ECG and main three

HRV parameters:

- total variability (TV)
- parasympathetic activity (PA)

TV/PA ratio

Analysis

A. During training. Mean HRV parameters for each minute will be calculated automatically.

- Normally after you start the exercises your TV, PA and TV/PA ratio are increased. After several minutes these parameters become lower and remain stable during training. With fatigue, however, the relative weight of parasympathetic activity is increased, while that of sympathetic is fallen. Thus to prevent fatigue and overtraining during each training you should avoid significant decrease (close to the rest level) of TV/PA ratio.

- If significantly heart rhythm abnormalities occur during training you will be informed by alarm function in the app.

B. Analysis of the result is compared it with the results of previous tests. Rest HRV parameters will be used for this kind of analysis automatically and you will see the tabs and graphs of their dynamics for various periods of time.

- It is expected that, with appropriate training between each test, the analysis will indicate an increase of TV and PA levels. Also, an increase of these parameters is the sign of the improvement of functional reserves and the general state of your health (decrease of the risk of type-2 diabetes, cardiovascular disease, and early death). If your TV and PA are decreased, it could be a sign of overtraining or inadequate exercise load.

- It is known that overtraining is accompanied by significant decreases in vagal activity and increases in sympathetic activity after the training. That's why to prevent overtraining you should avoid a significant increase of TV/PA ratio during the training period (especially on the 3d-5th days after training). If you have an increase of TV/PA ratio on these days you should decrease your training load.

MONITORING OF THE TRIMP

Why TRIMP

There are various ways of measuring the impact of exercise and these measures are often termed "Training Impulse", or **TRIMP** (**TR**aining **IMP**ulse). The simplest approach is to use training volume (mileage or time), but it is better to use Heart Rate. TRIMP is often used by athletes to derive the appropriate balance between challenging workouts and recovery sessions. We provide continuous ECG recording with the hospital level of the signal, and it is the best way to calculate not the pulse on your hand but real heart rate.

Assessment

HeartIn®FA uses the most sophisticated approach based on 'Heart Rate Reserve' and an exponential scaling factor to compute the most accurate **TRIMP^{exp}**. Another approach is based on Heart Rate zones. Instead of treating Heart Rate is a continuous range of values, it is divided up into different zones. These zones are based on the percentage of the Maximum Heart Rate. **HeartIn®FA** determines the intensity of your exercise in accordance with five zones.

During training you can see your ECG and main two

TRIMP parameters:

- TRIMP^{exp} (TRIMP)
- Heart Rate zones

Analysis

A. During training. TRIMP and your Heart Rate zone for each minute will be calculated automatically.

- Normally after you start the exercises your TRIMP are increased. According to TRIMP you can check the level of your exercise intensity.

- Within each Heart Rate zone, subtle physiological effects take place to enhance your fitness:

  I. Recovery Zone

  This is the very low-intensity zone. Training at this intensity will boost your recovery and get you ready to train in the higher heart rate zones.

  II. Endurance (aerobic) Zone

  Training within this zone develops basic endurance and aerobic capacity. Your body will get better at oxidizing – burning – fat and your muscular fitness will increase along with your capillary density. It is an essential part of every runner's program. Keep at it and you'll reap the benefits later.

  III. Stamina (aerobic) Zone

  Training in this zone will develop your cardiovascular system. The body's ability to transport oxygen to, and carbon dioxide away from, the working muscles can be developed and improved. Training in this zone will make moderate efforts easier and improve your efficiency.

  IV. Economy (anaerobic) Zone

  You'll be breathing hard and running anaerobically. Training in this zone will develop your lactic acid system. In this zone, your individual anaerobic threshold (AT) is found. There is a point at which the body can no longer remove the lactic acid from the working muscles quickly enough. If you train at this intensity, you'll improve your speed endurance.

  V. Speed (anaerobic) or Red Line Zone

Training in this zone will only be possible for short periods. It effectively trains your fast twitch muscle fibers and helps to develop speed too. This zone is reserved for interval running and only the very fit are able to train effectively within this zone.

B. After training you can check how much time (%) you trained in each zone this day or before and see the TRIMP of previous tests in the graph of its dynamic for various periods of time.

- With appropriate training your mean TRIMP will increase according to your performance with the improvement of your cardiovascular system.

Choosing the right training zone, you can get the result that you would like to get.

HeartIn Fit®

User guide