

Sport Training System Based on ECG Monitor

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Abstract

Heart rate variability (HRV) is a physiological phenomenon denoting inconstancy of the interval between heart beats. Power spectrum analysis of heart rate variability (HRV-PSA) is a non-invasive tool, which is currently used for a variety of purposes, such as quantification of autonomic modulation during exercise and recovery, assessment of autonomic changes associated with the short-term and the long-term exercise training [1], monitoring of training load, and detection of overreaching and overtraining [2], what can cause sudden death [3].

The ability of HRV-PSA to detect the overreaching and the overtraining can be used to assess a person's readiness to have a load. It can be used for creation of the personalized training schedule to provide optimal training load for a person. Moreover, by analyzing all HRV registrations, it is possible to determine trend of fitness, what can be applied for either personal use or progress monitoring in rehabilitation services.

The most popular systems for HRV registration are provided by Polar [4]. These systems are based on pulse data processing, so they do not provide any additional information about heart condition that could be useful for a complex patient monitoring in rehabilitation services.

We propose a project, which is intended to development of a portable system for the training monitoring based on the electrocardiogram (ECG) monitor. The main components of the system are ECG monitor (Alive Heart and Activity Monitor [6]), and a special application for mobile device. As the first stage of the project, we implemented the application for Android platform, which receives ECG data from the monitor via Bluetooth, detects beat-to-beat intervals, and analyzes them with the use of the HRV method. The main features of the application include ECG and HRV histogram visualization, analysis of the dynamics of the overall fitness during regular trainings, keeping of the training diary.

The system can be used as a personal training assistant, which helps to monitor the endurance improving and to prepare training plan avoiding overreaching and overtraining.

The next stage of the project will be directed to gaining additional information from the ECG signal.

Index Terms: ECG, monitoring, training, fitness.

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