

Mobile Arrhythmia Detector

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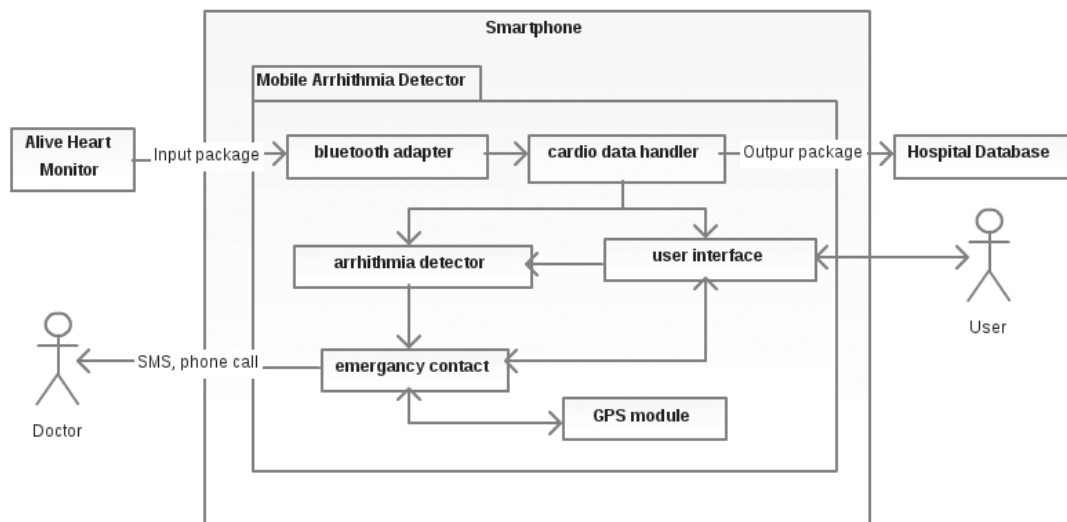
Abstract

Mobile Arrhythmia Detector is an application for heart function monitoring of a patient. It provides a connection between cardiac monitor, patient and doctor. It is developing for smartphones with OS Symbian.

Cardiovascular diseases are the most significant reason of death in the world. Therefore it is necessary to support continuous monitoring of heart functions. Holter monitor used in Russian medicine is very uncomfortable since it is heavy device and it requires skilled doctor's help. Consequently it can't be used for long term monitoring.

Compact digital device and smartphone with special software are more convenient solution. It allows to speed up a processing of cardio data and initial detection of heart problems. The application requires Alive Heart Monitor (Bluetooth ECG and Activity Monitor). This device was developed by Australian company Alive Technologies. Alive Heart Monitor transmits cardio and auxiliary data by bluetooth.

The application provides parsing of data packets and extracts ECG data. Next if an active mode was enabled then user can watch his own cardiogram and some metrics of heart function, e.g. heart rate. In passive mode the application works in background. In the case of arrhythmia detection the user is warned. In emergency case the application can make a call or send a SMS automatically to doctor or relatives.



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Fig. 1. Architecture of application

The information present in the ECG characteristic wave peaks and time intervals between them are important. The waves in a normal record are named P, Q, R, S, and T and follow in alphabetical

order. Any abnormal change in the shape and variation of time intervals is considered as arrhythmia. An application will implemented to detect Normal beat segment, Tachycardia, Bradycardia, Sinus Arrhythmia, First-Degree Heart Block, Second-Degree Heart blocktachycardia, Ventricular Tachycardia, Ventricular Fibrillation and Ventricular Flutter using wavelet decomposition.

Often patient can't understand his cardiogram, the application should provide the transmission cardio data to hospital database. The long term monitoring leads to high traffic problem. It can be expensive for a patient. It is needed an effective algorithm of ECG compression, that would be adapted for using in mobile app. To achieve high compression ratio the following approach is applied. The input signal was transformed with Daubechies 9/7 DWT. Then the values of wavelet transform coefficients were compressed with arithmetic coder.

Index Terms: mHealth, ECG, arrhythmia.

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