# Analyzing rhythmical and morphological ECG properties to detect the influence of ectopic beats

Dipl.-Ing. Tobias Baas | tobias.baas@kit.edu | www.ibt.kit.edu/baas.php

The analysis of the heart rate turbulence (HRT) can be used to evaluate the risk of sudden cardiac death in patients with a history of myocardial infarction. For that purpose, ventricular ectopic beats have to be detected and classified. A method for automatic ectopic beat detection and classification based on a Support-Vector-Machine (SVM) was developed before. In this work, an analysis similar to the HRT should be carried out on the morphological features of the QRS complex and the T wave of the ECG following a ventricular premature contraction (VPC). A dataset of 56 subjects, suffering from a various number of ventricular premature contractions should be used to conduct the study.
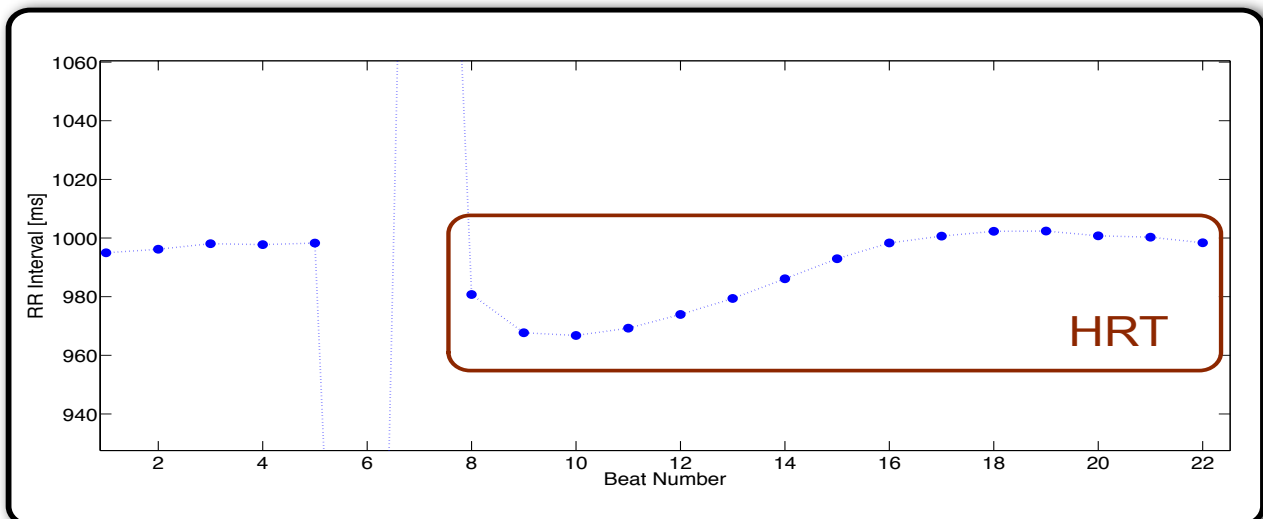
The process of the ECG signals should start with noise reduction filters and the removal of base line wander. Afterwards, QRS complexes and T waves should be detected and classified using the already existent classifier. A method to avoid artifacts should be also implemented. Synchronization between the information obtained from all ECG channels is also done to ensure robustness. Subsequently, the morphological properties of the QRS complexes and T waves after a VPC are calculated and compared to the properties of the same waves before the VPC.

The following tasks should be carried out during the research project:

1. Literature research in order to learn more about the heart rate turbulence.
2. Development of noise reducing filters and removal of base line wander.
3. Detection and removal of artifacts.
4. Multichannel analysis to improve the robustness of the algorithm.
5. Evaluation of rhythmical and morphological properties of the ECG after a ventricular premature contraction.