

Determination of low hemoglobin level in human using the analysis of symbolic dynamics of the heart rate variability

## I. Introduction

Hemoglobin is the major transporter of oxygen to cells in the human body. Reduced hemoglobin level (anemia) is an undesirable state of an organism, which leads to a number of clinical consequences [1]. In addition, a decreased level of hemoglobin is a contraindication for a blood donation. World Health Organization (WHO) recommends to exclude the donation from men with hemoglobin concentration below 135 g/l and from women with hemoglobin concentration below 125 g/l [2]. Therefore, the issue of quick, non-invasive and painless determination of a hemoglobin value is essential. Recently, the correlation between an electrocardiogram (ECG) and a concentration of hemoglobin in a human blood was found [3]. Particularly, authors had found that tachycardia and some ECG findings correlate with hemoglobin level. Electrocardiography is one of the most powerful, reliable and well-studied non-invasive testing technology and diagnostic method of cardiovascular diseases [4].