

ABSTRAK

Monitoring heart rate penting untuk dilakukan karena dapat mengindikasikan kelainan irama detak jantung dan beberapa penyakit serius seperti gagal jantung. Saat ini metode monitoring heart rate menggunakan photoplethysmography telah menarik banyak perhatian karena keunggulannya yang dapat digunakan dalam wearable device. Namun, hasil perekaman photoplethysmography rentan terkena gangguan motion artifacts yang dapat menurunkan tingkat akurasi pembacaannya. Salah satu hal yang dapat dilakukan untuk memperbaiki sinyal PPG adalah menerapkan filter pada sinyal hasil rekaman. Penelitian ini bertujuan untuk mengetahui kinerja filter Finite Impulse Response dalam mereduksi motion artifacts sinyal heart rate photoplethysmography menggunakan metode band-pass filter. Penelitian dilakukan dengan membuat modul alat monitoring heart rate menggunakan sensor SKU: SEN0203, Arduino Nano, MATLAB. Penelitian dilakukan kepada 10 responden, hasil menunjukkan bahwa terdapat 2 fitur yang memiliki korelasi tinggi terhadap sinyal PPG yaitu mean frekuensi dan nilai skewness. Dengan menggunakan filter, nilai error mean frekuensi dapat diturunkan dari 10% menjadi 0,23% dan nilai error skewness diturunkan dari 74,9% menjadi 21,69%. Dari hasil yang diperoleh dapat disimpulkan bahwa filter Least Square dan Constrained Least Square orde 50 memiliki kinerja lebih baik dari filter lain yang diuji.

Kata kunci: Finite Impulse Response, Motion artifacts, Heart Rate, Photoplethysmography.

ABSTRACT

Heart rate monitoring is important because it can detect heart rhythm abnormalities and some serious diseases such as heart failure. Currently, the heart rate monitoring method using photoplethysmography has attracted a lot of attention because of its advantages that it can be used in wearable devices. However, the results of photoplethysmography recordings are susceptible to interference with motion artifacts that can reduce the accuracy of their readings. One of the things that can be done to improve the PPG signal is to apply a filter to the recorded signal. This study aims to determine the performance of the Finite Impulse Response filter in reducing the motion signal of the photoplethysmography heartbeat signal using the band-pass filter method. The research was conducted using SKU sensors: SEN0203, Arduino Nano, MATLAB. The study was conducted on 10 respondents, the results show that there are 2 features that have a strong correlation to the PPG signal, namely the mean frequency and skewness value. By using a filter, the mean frequency error value can be reduced from 10% to 0.23% and the error skewness value is reduced from 74.9% to 21.69%. based on several performance, we concluded that FIR Least Square and constrained least square Order 50 have best performance among the other filter that we have been test.

Keyword: Finite Impulse Response, Motion artifacts, Heart Rate, Photoplethysmography