

Monitoring and Control of Cardiovascular responses by using portable devices

By

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Certificate of Original Authorship

I, Hamzah Alqudah, certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis, itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:

Date:

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List of Equations:

$HR_{max} = 220 - Age$	Equation 1
$HR_{max} = 205.8 - 0.685 \times (age)$	Equation 2
$HR_{reserve} = HR_{max} - HR_{rest}$	Equation 3

ABSTRACT

Interval training is an effective training protocol which helps strengthening and improving the athletes cardiovascular.

Heart rate (HR) and oxygen uptake (VO_2) are major indicators of human cardiovascular response to exercises, observing these two factors can help predict energy expenditure (EE) which is an important factor in improving cardiovascular health. HR and VO_2 measurements can also aid early detection of cardiac diseases. The measurements of oxygen uptake and heart rate during sport or life activities are of great interest for development of training programs and the study of their effects on elite athletes or for assessing the efficacy of a rehabilitation therapy.

A common method for evaluating the effects of endurance training is the monitoring of various respiratory parameters during exercise. One difficulty to achieve this goal during sport or different life activities is to use a reliable and valid portable system to measure the HR in a field setting. Such a portable apparatus may also be useful to determine the energy cost of many sport and real life activities.

In this thesis, a portable device from Texas Instruments has been used to measure the Heart Rate. The eZ430-Chronos watch was reprogrammed and customized to measure the heart rate and to respond accordingly to eliminate any risk while exercising and to develop the exerciser cardiovascular fitness.