VALIDITY OF ELECTROMECHANICAL IMPEDANCE-BASED MEASUREMENT FOR HUMAN HEALTH DIAGNOSIS

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3. Acknowledgements

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4. Enhanced Research Title and Objectives

Original Title as Proposed:

VALIDITY OF ELECTROMECHANICAL IMPEDANCE-BASED MEASUREMENT FOR HUMAN HEALTH DIAGNOSIS

Improved/Enhanced Title:
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Original Objectives as Proposed:

(i) To study the characteristics of the bio-signals obtained using the proposed electromechanical impedance system

(ii) To conduct proof of concept testing using the developed bioimpedance system for health diagnosis of human body.

Improved/Enhanced Objectives:
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5. Report

5.1 Proposed Executive Summary

Cardiovascular disease is one of the main causes of dealth around the world. While treatment using drugs or implant surgeries are able to control the disease, continuous health monitoring is vital to prevent failure of the cardiovascular system. Bioimpedance method is one option that can be used to diagnose cardiovascular problems. Bioimpedance is a measure of opposition to flow of electric current through the tissues, the opposite of electrical conductivity. Because electrical conductivity can vary as a result of breathing and other sources of variability, the reliability of bioimpedance for obtaining accurate data has been questioned. Nevertheless, this technique is used in both routine clinical medicine and research. Recent advances in smart piezoelectric devices such as lead zirconate titanate (PZT) and marco fiber composite (MFC) have opened new opportunities for health diagnosis. These materials have unique molecular structures that allow bidirectional electromechanical coupling between electric field and mechanical strain and thus they can be used as both actuators and sensors simultaneously. In this study, a new (electromechanical) bioimpedance measurement using a peizoelectric device as collocated actuator-sensor is proposed. The proposed system differs from previous works on bioimpedance by using a piezoelectric device for active sensing of the energy transfer from the device to a host and measuring its response simultaneously. Realiability and validity tests will be conducted by monitoring the bio-signals in the electromechanical impedance acquired from the piezoelectric device. The impedance changes can provide only qualitative assessment and hence a scalar metric is proposed to be used for quantitative evaluation of health of the human host. The proposed new bioimpedance system is promising due to its low cost, portable and simplicity in measurement.