

Development of non-invasive blood-glucose measurement system A bio-impedance approach

Abstract

Diabetes is already the world's most costly epidemic. Current glucose monitoring are invasive, which requires painful procedures and not reliable for long term usage. Impedance of human skin provides details about physiological structure and chemical composition of the skin and underneath tissues. Glucose concentration will affect the dielectric properties of cellular membranes, and therefore, changing the impedance of the blood. This paper describes a non-invasive measurement continuous glucose monitoring system based on bioelectrical impedance. In this project, an alternative current constant current source with a frequency of 50 kHz and peak-to-peak of 1mA is developed and injected to the finger tip through the developed tetra-polar electrode. The voltage drop across the finger will be measured and also used to determine the variation on glucose concentration. The developed prototype device will help to manage the painful procedures, cost-effective and reduce the infection rate as compared to the conventional invasive technique. Preliminary results show that 80% of measurement accuracy of the developed system measured non-invasively blood glucose by means of bioelectrical impedance.

Keywords — Blood-glucose, bioelectrical impedance, constant current source, non-Invasive measurement