Non-invasive Blood Glucose Monitoring System Using Painless Near InfraRed Based Technique and Linear Regression Analysis

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Abstract. According to the world health organization Diabetes has become one of the largest chronic diseases faced by humankind mainly in the 21st century, the disease is recorded at 8th in the most common causes of death. It is expected to be the 5th cause of death by 2030. Since there is no permanent cure or enough effective prevention, the only way to control the disease is through constant monitoring and medication. The current monitoring systems are invasive. Which needs patients to prick their finger to get a small amount of blood sample to check the glucose level of a patient using non-reusable biochemical reaction stripe. It's clear that this method is costly, bit painful and leads to allergies may be a cause for spreading diseases. Most of the patients are demotivated to test constantly, mainly due to the above reasons. These reasons lead to design a non-invasive blood glucose monitoring system, which uses painless near infrared based optical technique to detect the sugar level of a human body. The designed system includes a LED emitting signal, which is of 940 nm wavelength. Those optical rays will be sent through the fingertip or ear lobe and the reflected light ray will be caught by a phototransistor located behind the LED. Glucose concentration of the body will be determined by the intensity variations of the transmitted and reflected optical rays. The results obtained from the designed system is evaluated with a self-monitoring system. (One-Touch Ultra 2). The results show the feasibility of using NIR based non-invasive method for measuring the blood glucose concentration of a human body.

Keywords: *Blood Glucose, Non-Invasive, Near Infrared*