

ABSTRACT

Diabetes Melitus (DM) is a prevalent chronic disease worldwide. Various methods are available for measuring blood glucose levels. Invasive blood glucose measurement is an effective and highly accurate method, with devices like glucometers accessible to everyone. However, in some cases, this method can be traumatic for patients due to blood sampling requirements. Non-invasive blood glucose examination offers an alternative to address the issues of invasive methods. One non-invasive method for sampling blood glucose levels is NIR-LED spectroscopy. In this study, a device based on ESP8266 microcontroller and sensor, including NIR-LED transmitters (850nm, 910nm, 980nm, and 1050nm) and BPW-34 photodiodes as NIR-LED light receivers in reflection mode, was designed. The data acquisition process involved 26 male and female volunteers aged 20-25 years, using the designed tool. Pulse data was collected and visualized as a PPG (Photoplethysmograph) signal on the fingertips, upper and lower wrists, and its maximum value was analyzed based on the Lambert-Beer law. The analysis results showed that measuring at the fingertips produced good PPG signals. Using the NIR-LED 850nm yielded a lower error rate of 14.98% compared to other NIR-LEDs.

Keywords: Diabetes Mellitus (DM), NIR-LED spectroscopy, Lambert-Beer Law, Photoplethysmograph.