Abstract

In recent years, with the proliferation of wearable devices, wearable watches and wristbands capable of measuring physiological information have become indispensable tools for many in modern society. These wearable devices allow individuals to monitor real-time physiological data, such as heart rate, blood pressure, and blood oxygen concentration, to maintain their health. However, there is currently no non-invasive method available on the market for measuring blood-related information within the human body.

Therefore, this study aims to investigate whether wearable devices can provide a non-invasive means of acquiring blood-related information through related signal processing algorithms and neural network models, utilizing an All-Wavelength Photoplethysmography (AWPPG) approach combined with neural network models for accurate measurement of blood information. The research is divided into three main components: the development of a non-invasive wearable device, the collection of blood information in a clinical setting, and the exploration of one-dimensional signal algorithm models.

Currently, we have collected blood-related data at the hospital using our self-developed AWPPG measurement device. We have also trained artificial intelligence models for various blood parameters. The accuracy rate for blood glucose is seventy percent, while for hemoglobin, platelet count, sodium ion concentration, calcium ion concentration, and total protein content, the accuracy rate is approximately sixty to seventy percent.

Key words: Wearable Devices, Non-Invasive Sensing System, Neural Network Model