

ABSTRACT

The use of venipuncture and intravenous injection in medical practice, such as infusion, blood transfusion, and laboratory sample collection, often encounters difficulties in locating veins in patients with specific conditions such as obesity, burns, or small blood vessels in children and infants. Factors such as genetics, gender, age, daily activities, and health status affect the difficulty of finding venous blood vessels. Additionally, intravenous injections can lead to complications such as phlebitis, caused by chemical irritation, bacteria, or mechanical factors. Phlebitis, especially of a mechanical nature, can occur due to the placement of a cannula in the metacarpal vein, which is often exposed to hand or joint movements. This research aims to develop strategies to reduce the risk of difficulty in finding blood vessels and complications related to intravenous injections through the creation of a vein detection device. The purpose of this vein detection tool is to facilitate the process of detecting the Vena Dorsalis Manus blood vessels on the dorsum of the human hand using the image processing method of Contrast Limited Adaptive Histogram Equalization (CLAHE). The components used to create this tool include an array of infrared LEDs, a NoIR (No Infrared) camera, Raspberry Pi 3 Model B as its microcontroller, and an LCD Display. As a non-invasive healthcare tool, this vein detection device is safe to use when detecting Vena Dorsalis Manus blood vessels. It can be used in dark environments with a light intensity level of 0 lux and in well-lit conditions with a light intensity level >250 lux, based on hospital room lighting standards. The results of detecting Vena Dorsalis Manus blood vessels remain consistent, similar to when used in well-lit rooms. The device can display Vena Dorsalis Manus blood vessels with a wide range of pixel intensity values from 0 to 255 and an accuracy of Vena Dorsalis Manus blood vessel positions of ± 1 mm.

Keywords : Veins, *Dorsal Manus Venous*, *Dorsum Manus*, Array of LED, NoIR Camera, LCD Display, image processing, CLAHE.