Development of Image Processing Algorithm for Vein Detection System

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The process of obtaining intravenous access, vein puncture is an everyday invasive procedure in medical settings. A major problem faced by the nurses today is difficulty in accessing veins for intravenous drug delivery and other medical situations. Hence a vein detection device which can clearly show veins is a useful biomedical engineering application. The accessibility to existing devices are limited due to their high costs. When considering patients admitted into hospital wards, the nurses have to struggle with majority of them to access a peripheral venous line. The probability of it is as high as 80% depending on the condition of the patient and the location of the hospital. Although a peripheral vein can be accessed in a single attempt, in a substantial number of patients the attending nurse needs multiple attempts to insert the needle successfully. Excessive vein puncture are both time and resource consuming events, which cause anxiety, pain, and distress in patients, or can, lead to severe harmful injuries. Therefore it is a significant problem in emergency rooms and during a hospital stay. This research deals with the design and development of low-cost non-invasive subcutaneous vein detection system based on near infrared imaging. In here our priority is focused for development of image processing algorithm to extract vein pattern from a acquired near infrared image. Vein detection system uses an infrared light source (740 nm) to illuminate veins in hand. A snapshot of the region is taken by the modified visible light camera to IR region and it is subjected to existing image processing techniques and author's validity function. Finally the extracted vein pattern is used to project back to the skin of the patient.

Keywords: Vein puncture; Vein detection; Near-infrared imaging