A Real-Time Vein Imaging System Using Image Processing Algorithms On Images Obtained From A Standard Smartphone Camera

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Vein imaging systems have been used in the medical industry for many years. Most of them work by using the Near Infrared Imaging technique. However, using such a technique made the devices expensive, bulky, and out of the reach of the common people. We explored into low cost implementation of vein imaging on a smartphone and came up with SAMIS, an easily accessible vein imaging solution using an android app. We tested different image processing techniques ranging from thresholding to Fourier transforms and determined that simple RGB channel mixing revealed the most venous details in an image of the user's hand. To implement this on a smartphone we also had to focus on providing the right lighting conditions when capturing an image of the user's arm. As a first step, we tested various light sources and determined that the smartphone's built in flash was adequate for obtaining images with the necessary details. We then built a software to process the RGB image from the smartphone's camera to reveal the veins present in the image of the user's hand. The software combines information from the colour channels through a linear blend after which CLAHE is used to improve contrast. Our application is capable of processing individual images captured by the user as well as video streams from the camera for real-time processing. Through this technique we were able to generate images which better highlighted veins in the user's hand using only the information obtained from a standard smartphone camera.

Awards Won:
Second Award of $2,000