VTE GTG: Using Near Infrared Light to Create a Vein Map to Accurately, Quickly and Safely Diagnose Venous Thromboembolism

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Venous Thromboembolism (VTE) is a vein disease which affects millions of people around the world, which if left untreated, could cause death. At the moment, the commonly used techniques for diagnosis of this disease are Venography, Ultrasonography, and CT Scans, which all come with their own drawbacks. Venography involves injecting dye into the bloodstream which has the danger of leading to allergic reactions and nephrotoxicity. Ultrasonography falls short in accuracy, leaving about 50% of VTE cases undiagnosed. Finally, CT scans are very high in cost and radiation which could lead to worse problems (such as cancer). This project took advantage of the property of infrared light to penetrate skin and be scattered forward by the blood cells in our veins to create an accurate vein map when used in conjunction with a camera with a removed infrared filter. This map was passed though image processing software to magnify the contrast and create a binary image. This was used with a proprietary algorithm called chromametry to measure the pixel density of the veins based on their RGB values and return information about width. When tested on healthy patients, the width of the vein remained uniform (within a margin of error) 100% of the time. The project was done for 36 dollars using mostly common household items, a 550% price reduction. Because it takes into account all the impediments of the existing solutions (low cost, very safe, accurate), VTE GTG could very well become an industry standard for diagnosis of Venous Thromboembolism.

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