

Method of Detecting and Locating The Blood Vessels (arteries & veins)¹

Safa Sarakbi²

Nadim Chahin³

Reiner Schmitt⁴

Abstract

The purpose of this research is to detect, locate, and define the blood vessels in the arm of any person who has a problem in taking samples of blood for laboratory testing in order to make it easier, not dangerous nor harmful.

Depending on the properties of the scattering wave from the blood and the depth of the penetration, we have calculated the frequency which is necessary to choose the suitable transducer including the Geometric Dimension as well as the materials which is made from (we have taken the 5MHz Doppler –CW for 1.2 cm depth, 2.37 attenuation ratio and the 8MHz Doppler –CW for 0.74 cm depth , with the same attenuation ratio).

Depending on the velocity's variation of the blood flow throughout the Biodynamic studies for important arteries in the upper limb, we have found the Doppler frequency which occurs when the acoustic wave passes across the blood red cell. We have designed a suitable electronic instrument which includes the transmitter circuit, receiver circuit, and the output unit - Audio graph.

¹For the paper in Arabic see Pages (35-57).

² Faculty of Mech. & Elec. Eng.-Damascus University.

³ Faculty of Mech. & Elec. Eng.-Damascus University.

⁴ Fraunhofer Institute – Saarland Uni. - GERMANY

The principle of the operation: The Oscillator generates a sine wave, which is sent to Doppler transducer (which is positioned on the skin surface in the arm) after it has been amplified. the Ultra Sound waves penetrate tissues and reflect back in a different frequency due to the Blood flow in the vessels, and after the wave is picked up by the receiver part of the transducer, we amplify, rectify ,and filter it (high pass filtering ,low pass filtering). Finally the waves move to the output unit which contains audio amplifier, and signal recorder for graphical display which represents the changes of the Doppler with the time, then the changes of the blood flow velocity (sonogram).

As a conclusion, we developed an instrument which can detect and locate the blood vessel in an easier way, this instrument doesn't need sterilization, however the frequent experiments which have been made on this instrument show very good results in addition to the high accuracy.

Key Words: Ultrasound Waves-Doppler Transducer--Blood Vessels- Blood Flow-Electronic Technique- knowledge Base