L. Venkatachalam, Development of hardware for impedance cardiography, M. Tech. Thesis, Department of School of Biosciences & Bioengineering, Indian Institute of Technology Bombay, 2006.

Supervisor(s): P. C. Pandey

Abstract - Impedance cardiography is a non-invasive technique for measuring cardiac output and for diagnosing cardiac disorders. The basal impedance of human thorax is normally 20-30 Ω and it decreases by 0.1-0.2 Ω during systole due to blood pumped into the thoracic region. This change in the thoracic impedance is sensed by injecting a high frequency (20-100 kHz) current (<5 mA) into the thoracic region through a pair of electrodes and by measuring the voltage across another pair of electrodes. The impedance variation thus measured is known as impedance cardiogram (ICG) and can be used for estimating stroke volume by using appropriate models of blood flow and can also be used for diagnostic information. The objective is to improve the hardware modules of the existing instrument for better performance. The oscillator module has been modified for better short term amplitude stability. The precision rectifier in the demodulator has been modified for better frequency response. The parameters of the drift cancellation circuit has been modified for better performance. An earlier microcontroller based designed thoracic impedance simulator has been enhanced by using a digital potentiometer based circuit, to simulate step and sinusoidal types of variation in change in the impedance, for testing and calibration of impedance cardiograph.