Navaneetha Krishnan S. Naidu, Hardware for impedance cardiography, M. Tech. Thesis, Department of School of Biosciences & Bioengineering, Indian Institute of Technology Bombay, 2005.

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*Abstract* - Impedance cardiography is a non-invasive technique for measuring cardiac stroke volume and diagnosing various cardiac disorders. The thoracic impedance varies during the cardiac cycle with the variation in amount of blood. This impedance change is detected by injecting a high frequency (20 to 400 kHz), low intensity (less than 5 mA) current through a pair of injecting electrodes and sensing the resultant amplitude modulated signal across the thorax through another pair of sensing electrodes. This amplitude modulated signal is demodulated and processed to obtain the cardiac stroke volume. The objective is to improve the hardware modules of the existing instrument for better performance. The oscillator module has been modified for improved short term amplitude stability. The demodulation scheme has been changed from a precision rectifier based one to a vector lock-in amplifier based demodulation. The parameters of the baseline restoration circuit have been modified for better performance. The existing thoracic impedance simulator has been modified to a compact microcontroller based circuit, to reduce internal wiring, and better user interface.