

Dr. Niranjana D. Khambete

Biography

Dr. Niranjana D. Khambete was born in Pune, a city well known for its fine weather and reputed educational institutions, and located close to Mumbai (Bombay) in west-central part of India. After completing bachelor's degree in Instrumentation Engineering from College of Engineering, University of Pune, he started his work for Larsen and Toubro Limited in Mysore (South India) in the companies Medical Electronics Production Group. Subsequently, he joined Indian Institute of Technology, Bombay and completed his Masters in Biomedical Engineering and immediately joined Sree Chitra Tirunal Institute for Medical Sciences of Technology in Thiruvananthapuram located at the southern most tip of the country. He has been working here for last 15 years and was also awarded Commonwealth Scholarship for 3 years to carry out research leading to PhD in The University of Sheffield, UK. His major research interests are bio-impedance techniques, bio-electrodes, and technology management in healthcare.

“Movement Artefact Rejection in Impedance Pneumography”

Impedance pneumography is a non-invasive technique of monitoring respiration and has been in clinical use for many years. The electrical resistivity of the lung tissue changes due to changes in air volume during breathing. These changes in lung resistivity combined with chest wall movement and diaphragm movement cause the overall impedance of the thoracic cavity to change during breathing. Impedance pneumography involves measuring these changes to monitor breathing.

It has been observed and reported that these impedance changes get largely affected by body movements, which are not related to breathing. These ‘movement artefacts’ can be large in amplitude and could entirely mask the breathing signal, thus making it impossible to derive any useful information regarding the breathing activity from the impedance signal.

The present work is aimed at developing a technique of rejecting these movement artefacts in impedance pneumography. The technique involves using a strategic four or six electrode placement, which provides at least two independent measurements of the thoracic impedance. These two measurements have been found to have an in-phase signal for breathing while an anti-phase signal for movement artefacts. Thus a simple addition of these measurements has been found to significantly reduce movement artefacts. These experimental results obtained on volunteers have been found to agree with the theoretical findings obtained through modelling studies. Further work is aimed at identifying optimum frequency of injected current to achieve further reduction in movement artefacts.