

A System for Reconstruction of Cough Sounds and Cough Sound Components

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The purpose of this project is to develop an auscultatory system that could be used to train physicians to identify components of cough sounds associated with lung disease. The system recreates cough sounds obtained using a previously described cough sound recording system [1]. A subject coughs through a mouthpiece coupled to a long flexible tube. In the tube, a microphone is mounted tangential to the tube wall near the mouthpiece. Cough sounds are digitized at 65.538 KHz and transferred to a personal computer. The playback system is similar. A speaker, in place of the subject, is coupled to the mouthpiece and a stethoscope is mounted next to the microphone. When played back, the original cough is normally distorted by the speaker. A system identification algorithm is utilized to obtain the playback system transfer function. The playback system is modeled as an n^{th} order digital filter. The filter order can be determined using Akaike's information theoretic criterion. The filter coefficients are determined using a batch least squares estimation technique. The inverse filter can then be used to modify the input to produce the original cough sound. Similarly, components of the cough such as wheeze may be identified, reconstructed and played back. Wheezes are extracted from the original cough using an adaptive filter technique. The complete system for playback and reconstruction of cough sounds is developed as a virtual instrument using the Labview software package. The system is capable of reconstructing cough sounds and cough sound components. Accurate reproduction of the original cough and/or wheeze is delivered to the stethoscope for screening or training.

- 1] Goldsmith, WT, JS Reynolds, WG McKinney, KA Friend, D Shahan, DG Frazer. A System for Recording High Fidelity Cough Sound Measurements. Proceedings 3rd International Workshop on Biosignal Interpretation, 1999; 178-81.

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PROGRAM



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