Review of Disordered Voice Enhancement

Digital Signal Processing Approaches

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Abstract

I will review different approaches to disordered voice enhancement using digital signal processing.

The main focus will be on larygectomee speech, where the need for improved voice is the greatest. Approaches for (tracheo-) esophageal speech that have been published include linear prediction analysis and synthetic source for resynthesis, voice modification techniques to adjust the formant structure due to the change in the anatomy of a laryngectomee.

The aim to suppress the buzz noise of an electro larynx, was approached e.g. by using adaptive filters, noise suppression techniques. There has been one project, where the myoelectro activity of muscles was used to control an e-laryx, so that handsfree communication could be possible. Another proposal was to use a special microphone, that is attached directly to the skin, that allows a very low volume e-larynx.

While the focus has been on improving alaryngeal speech, there have been some attempts to improve hoarse voices by rreducing the breathiness in disordered speech using singular value decomposition or state-space approaches.

Possible applications for those methods are e.g. a portable electronic device which helps the patient to cope with acoustically difficult situations in everyday life. For example for voice telephony there is almost no other possibility for augmentative communication.