Rahul Jain / Prof. P. C. Pandey (Supervisor), “Dynamic display of vocal tract shape for speech training”, *M. Tech. dissertation*, Department of Electrical Engineering, Indian Institute of Technology Bombay, June 2016.

Abstract

Children suffering from prelingual hearing impairments have difficulty in speech acquisition due to lack of auditory feedback. They can benefit by speech training aids providing corrective feedback, especially those providing visual feedback of key articulatory efforts. These aids should enable a comparison between the articulatory efforts of the student and that of a teacher or a reference speaker.

An application is developed for dynamic display of vocal tract shape to provide visual feedback for production of short utterances involving vowels, semivowels and diphthongs. It displays speech waveform, spectrogram, and areagram as validation tools. Intensity, pitch, and vocal tract shape are displayed for use in speech training. LPC analysis of the speech signal is used to estimate the vocal tract shape. The shapes estimated from the training aid match satisfactorily those obtained from MRI scans. The place of articulation is emphasized by highlighting place of maximum constriction and the corresponding opening at that place. Articulatory feedback is provided through 2D mid-sagittal view of the vocal tract, in the form of a variable rate animation. A GUI is developed for the speech training aid taking into consideration the requirements for use during training and practice. For providing corrective feedback, the display is developed with two panels, one for the articulatory efforts of the student and another for that of the teacher, for newly recorded utterances as well as pre-recorded ones.