G. Madhu Lekha / Prof. P. C. Pandey (Supervisor): “DCT-Based Spectral Subtraction for Speech Enhancement”, *M.Tech. Dissertation*, Department of Electrical Engineering, Indian Institute of Technology Bombay, June 2016.

# ABSTRACT

Spectral subtraction for speech enhancement has been widely investigated, using analysis and synthesis based on discrete Fourier transform and is reported to perform well for suppression of stationary noises. This thesis presents investigations on implementation of spectral subtraction using the discrete cosine transform (DCT) and its real-time implementation. DCT is considered suitable for this application because of its superior energy compaction and binary phase representation. The noise is estimated using a 3-frame 4-stage cascaded-median without involving a voice activity detector. The qualitative results are compared to that of the same technique used with DFT. Real-time implementation is done on a DSP board with the 16-bit fixed point processor TMS320C5515. The on-board codec is used to continuously acquire the input signal and output the processed signal at a sampling rate of 10kHz. DMA is used to facilitate the input and output buffering. A fast cosine transform implementation of DCT is realized and the on-chip FFT hardware is used for performing forward and inverse transformations. The real-time processing is implemented with a 300-point analysis-synthesis window and 512-point FFT. The implementation uses about 1/6th of the computing capacity, and the processing delay is approximately 49 ms, making it acceptable for hearing aid applications.