4. METHODOLOGY AND WORK PLAN

4.1 Methodology

STEP 1:

Apply voice activity detection algorithm for finding out silence period from the given input speech

STEP 2:

Apply wavelet thresholding for making silence part at zero magnitude

STEP 3:

Silence cleaned and wavelet threshold speech is passed for filtering for LMS, NLMS and RLS algorithm

STEP 4:

Compare all the applied algorithm for MSE and PSNR

STEP 5:

Apply filtered speech for the frequency band separation using wavelet and multi resolution approach of wavelet transform
Algorithms for mentioned steps for real time implementation.

1. **Read noisy wave file and define parameters**
2. **Compute first 100ms interval of speech consider as a noise profile**
3. **Decide average magnitude and zero crossing for this interval**
4. **Calculate statistical characteristic**
5. **Compute energy threshold and zero crossing using statistical cha. And average magnitude**
6. **Average magnitude profile is searched to find interval in which it always exceeds a very traditional threshold ITU**
7. **Go for back search from the point where En first exceeded the threshold ITU. Search tentative point N1 where En first falls below a lower threshold ITL**
8. **Repeat procedure to find out tentative end point N2**
9. **Move back word from N1 and forward from N2 comparing zero crossing rate to a threshold IZCT**
10. **If zero crossing rate exceeds the threshold 5 or more time N1 moved back at point which IZCT exceeded**
11. **Otherwise N1 is defined as the beginning point**

A. Repeat the procedure for the real end point.

B. Silence detected speech is given to wavelet algorithm.

C. Decide level of thresholding, type of thresholding and level of MRA in wavelet function.

D. For more filtering speech is ready to be given to Adaptive algorithm.
METHODOLOGY AND WORK PLAN

B

Take output of VAD algorithm with trimmed silence

Consider trimmed speech as a primary input of adaptive algorithm

Take butterworth filter with proper system order and cutoff

Prepare transfer function for system using butterworth coefficient

Prepare output Y of the LTI system using transfer function and input speech

Take desired signal by adding noise in the output of sys. Take initial samples of the speech for training and estimate filter coefficient

LMS, NLMS and RLS algorithm

Repeat procedure till stable values of coefficient

Prepared filter coefficient are used to produce filtered signal by multiplying coefficient with signal

Take difference between desired signal and filtered signal to produce error signal

Try to minimize error for getting better output

C

Take noisy initial noisy speech

Take filtered speech after application of each filter

Compare that for PNSR

Comparison of performance

D
4.2 Work Plan

1. Year 2009

Phase 1. Course work and Literature Survey of different types of filters, fundamental of wavelet, discrete wavelet transform and continuous wavelet transform, different types of speech noises and adaptive filters for noise reduction.

Phase 2. Study about different audiograms taken by audiologist. Recorded real time speech processing using discrete wavelet transform as per the requirement of the audiogram using MATLAB simulation.

2. Year 2010

Phase 1. Performance analysis of adaptive and non adaptive filter. Efficiency measurement of adaptive and non adaptive filter for noise reduction in speech signal. GUI development for non adaptive filter for noise reduction.

Phase 2. Development of speech pause detection algorithm and processing it to make conversation more clear. Calculation of zero crossing rate and energy vector for every possible speech.

3. Year 2011

Phase 1. Implementation of algorithm for combination of voice activity detection and adaptive filtering. Simulation of LMS and RLS adaptive algorithm for noise reduction. Detail study of level of noise reduction, rate of convergence of algorithm and developed PSNR and MSE.

Phase 2. Simulation of adaptive NLMS algorithm. Comparison of the entire three algorithms in terms of MSE and PSNR. Thesis writing and paper publications.