



BIEN 2011

Automatic Volume Leveler for Real Time Speech Applications

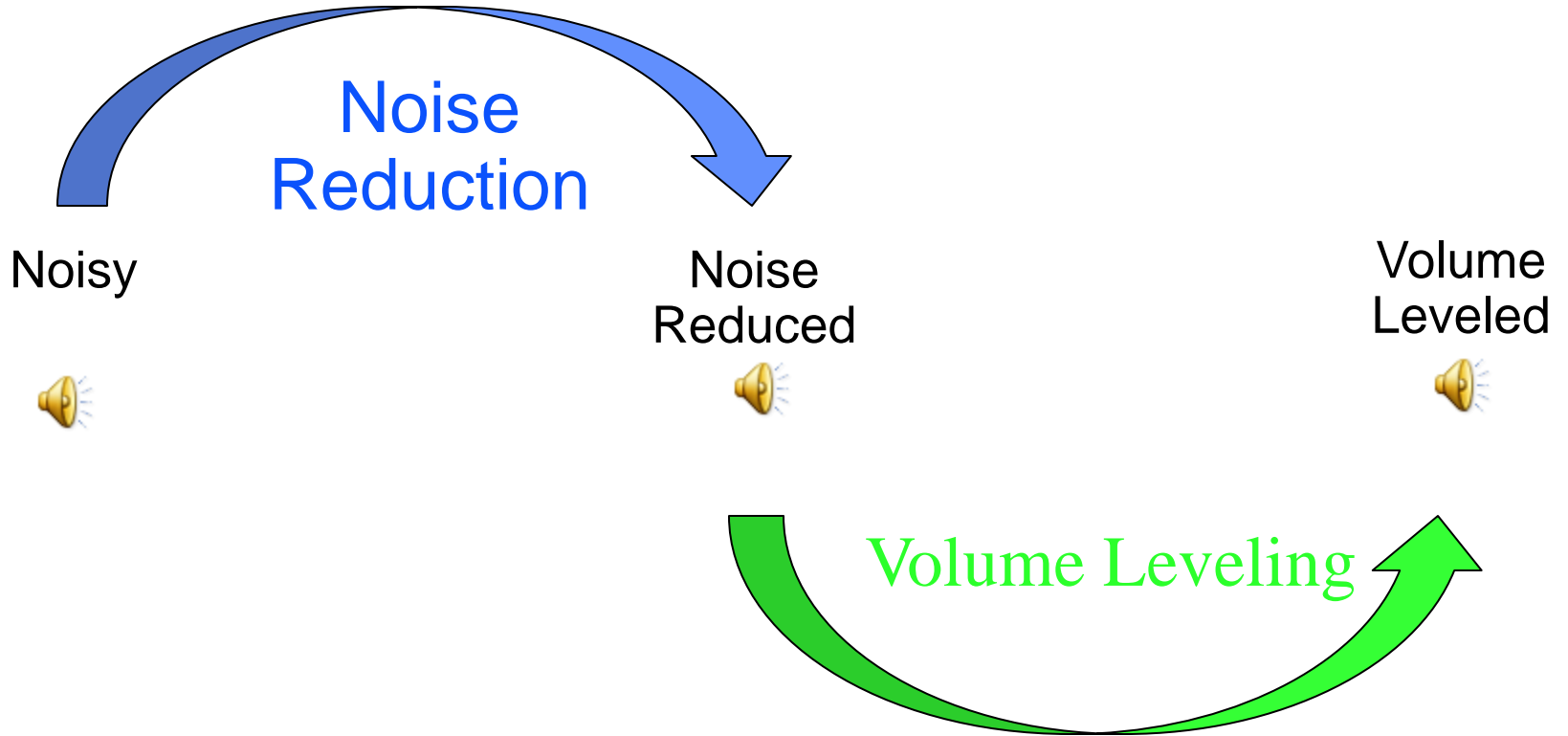
Justin Bare

Dr. Carol Espy-Wilson

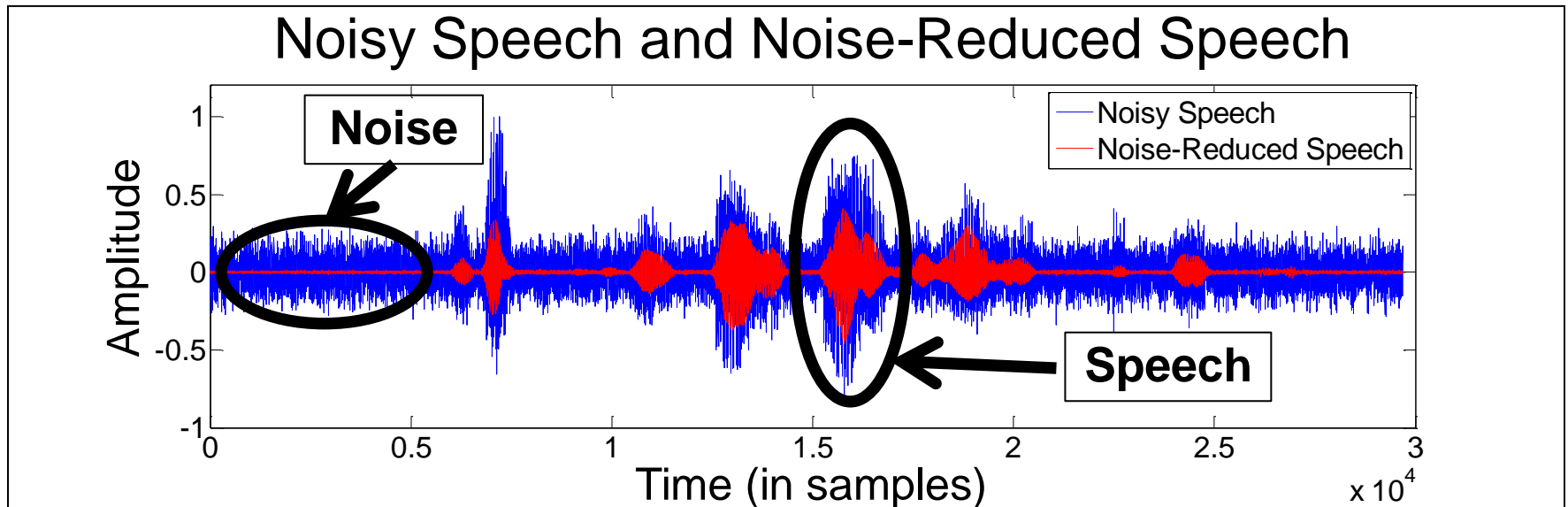
Dr. Tarun Pruthi



The Volume Leveler

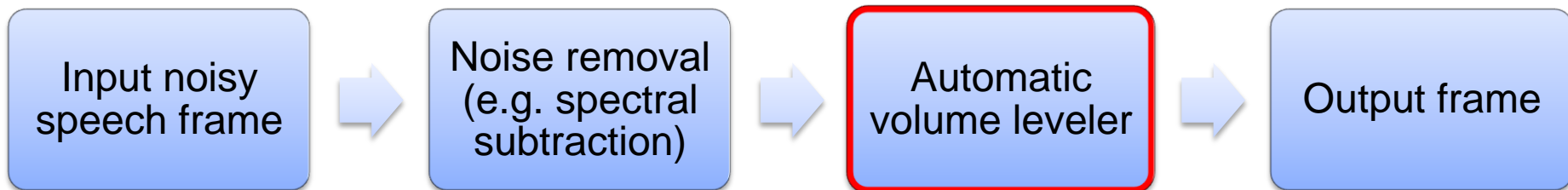


- Noise reduction is useful
- But it has problems:
 - Attenuation of speech
 - Changes in color or timbre and loudness

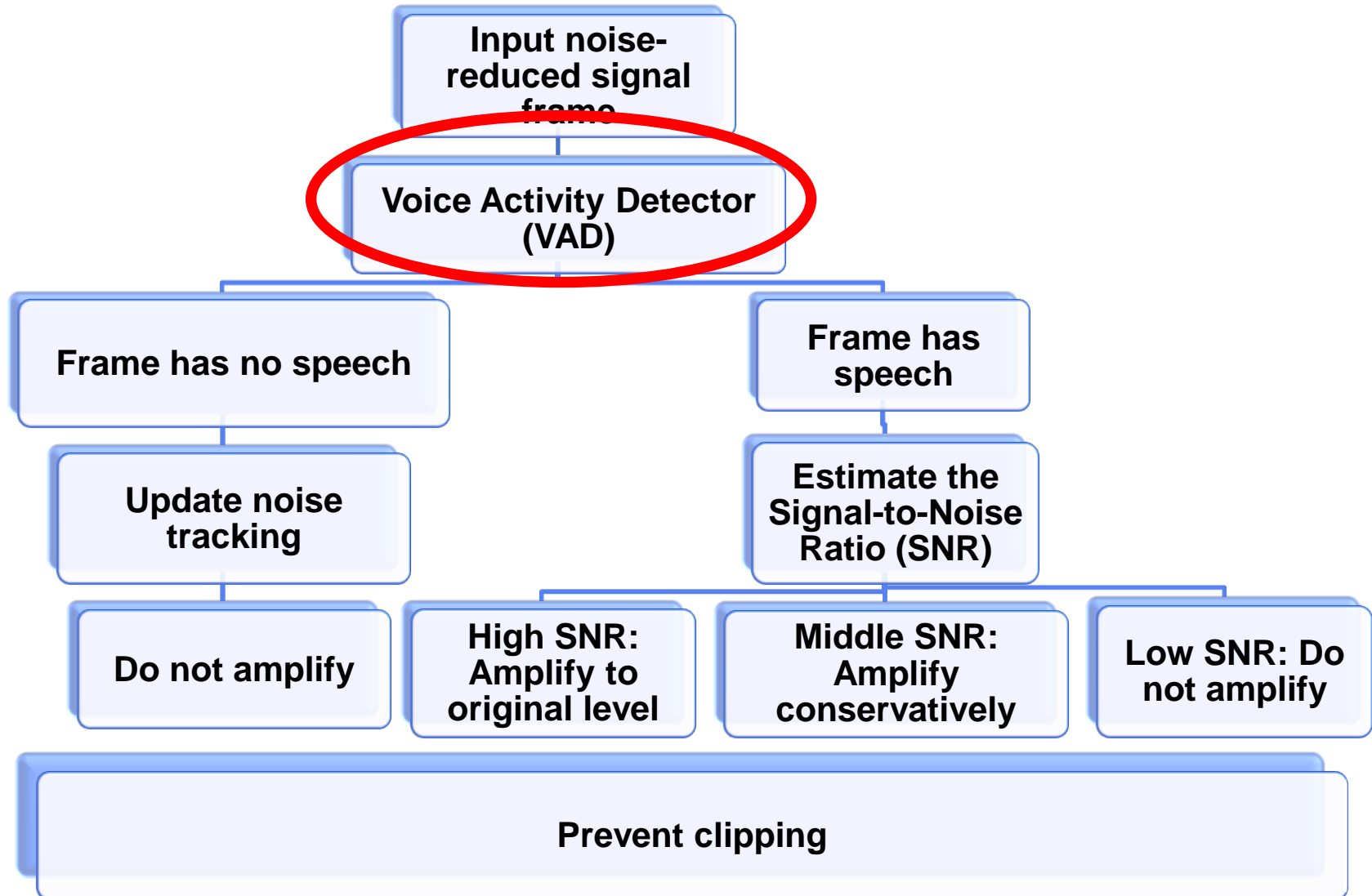




- My goals for the automatic volume leveler
 - Fix speech attenuation
 - Restore loudness
 - Ensure no clipping occurs in output signal
 - Do all of the above under real-time constraints
 - Only present and past frames of signal are available
- For each frame (0.01 seconds) of signal:

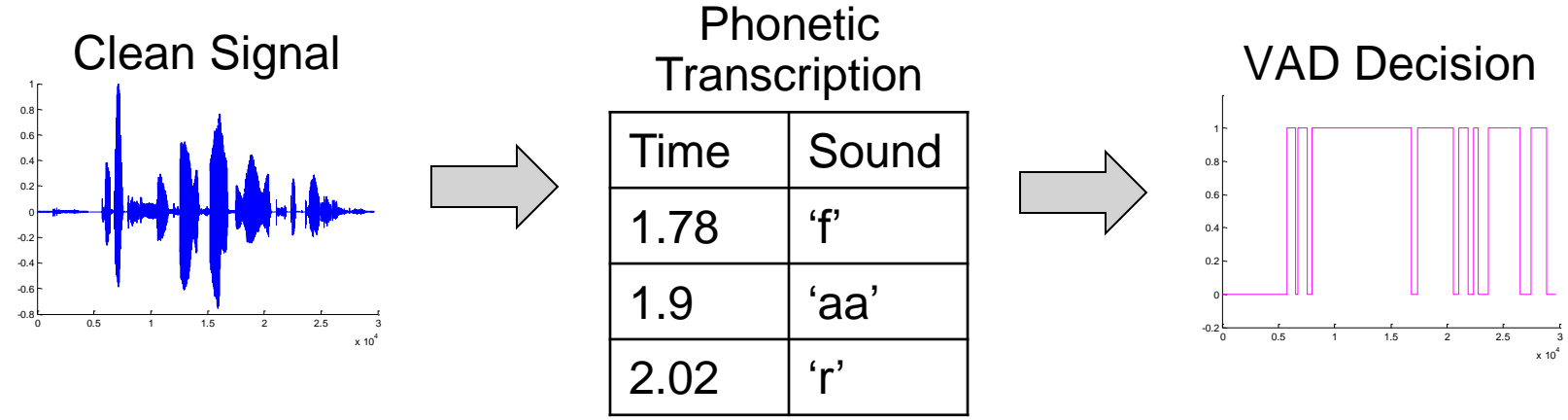


Algorithm



Ideal vs. Real VAD

- Ideal VAD (not obtained in real time)

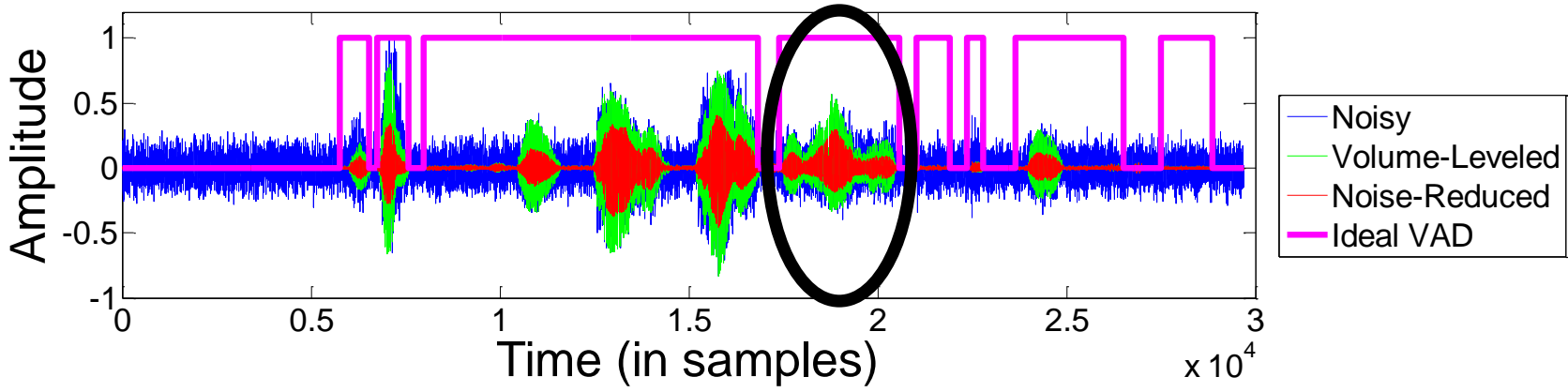


- Real VAD (obtained in real time)

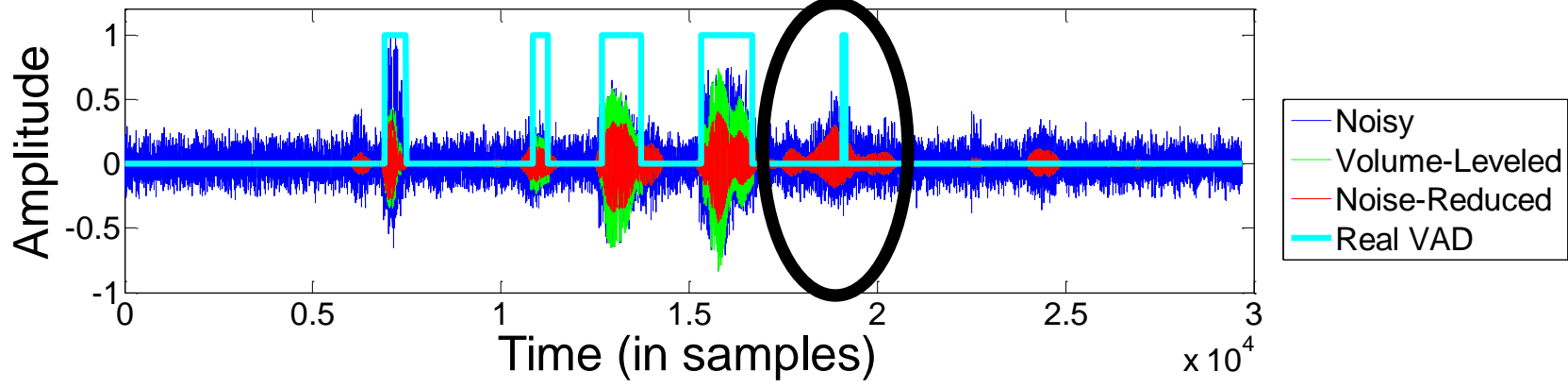


Ideal VAD vs. Real VAD

Volume-Leveler Using Ideal VAD



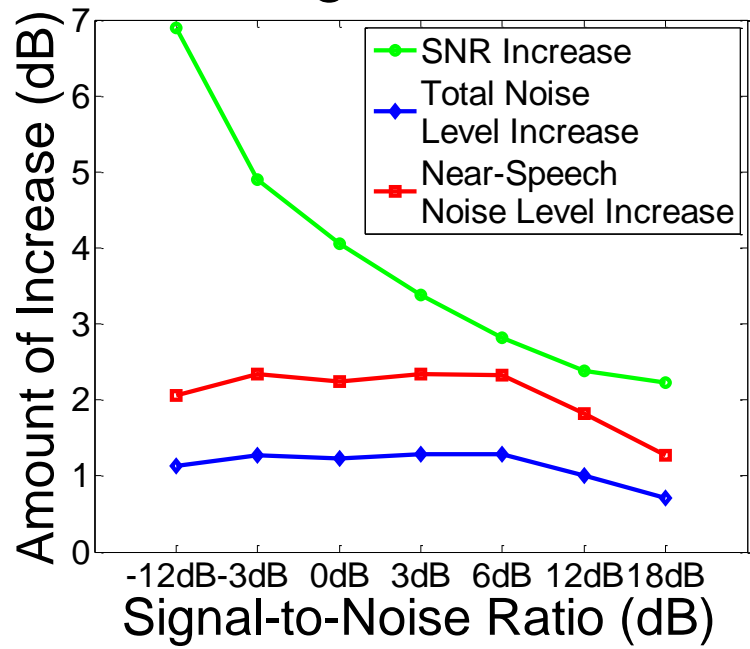
Volume-Leveler Using Real VAD



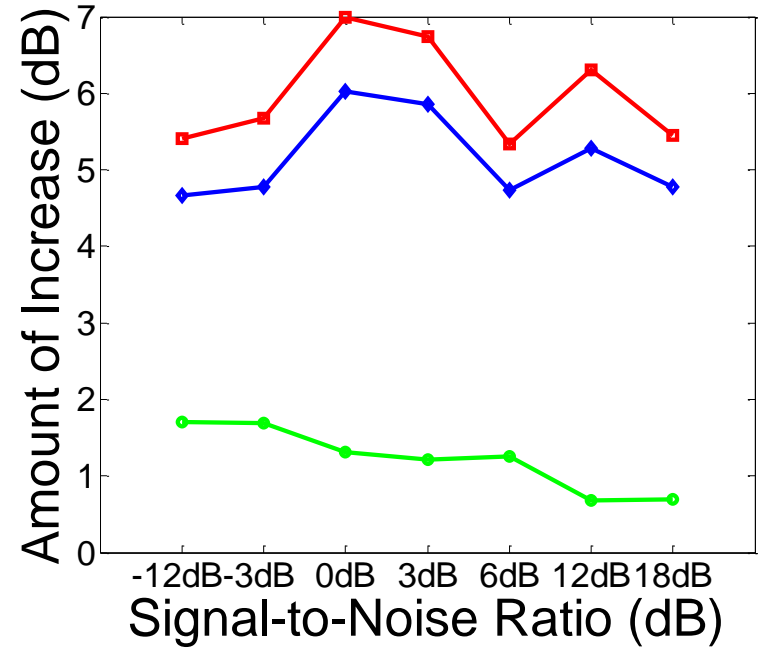


Ideal VAD vs. Real VAD: SNR and Noise Level Increase

Using Ideal VAD



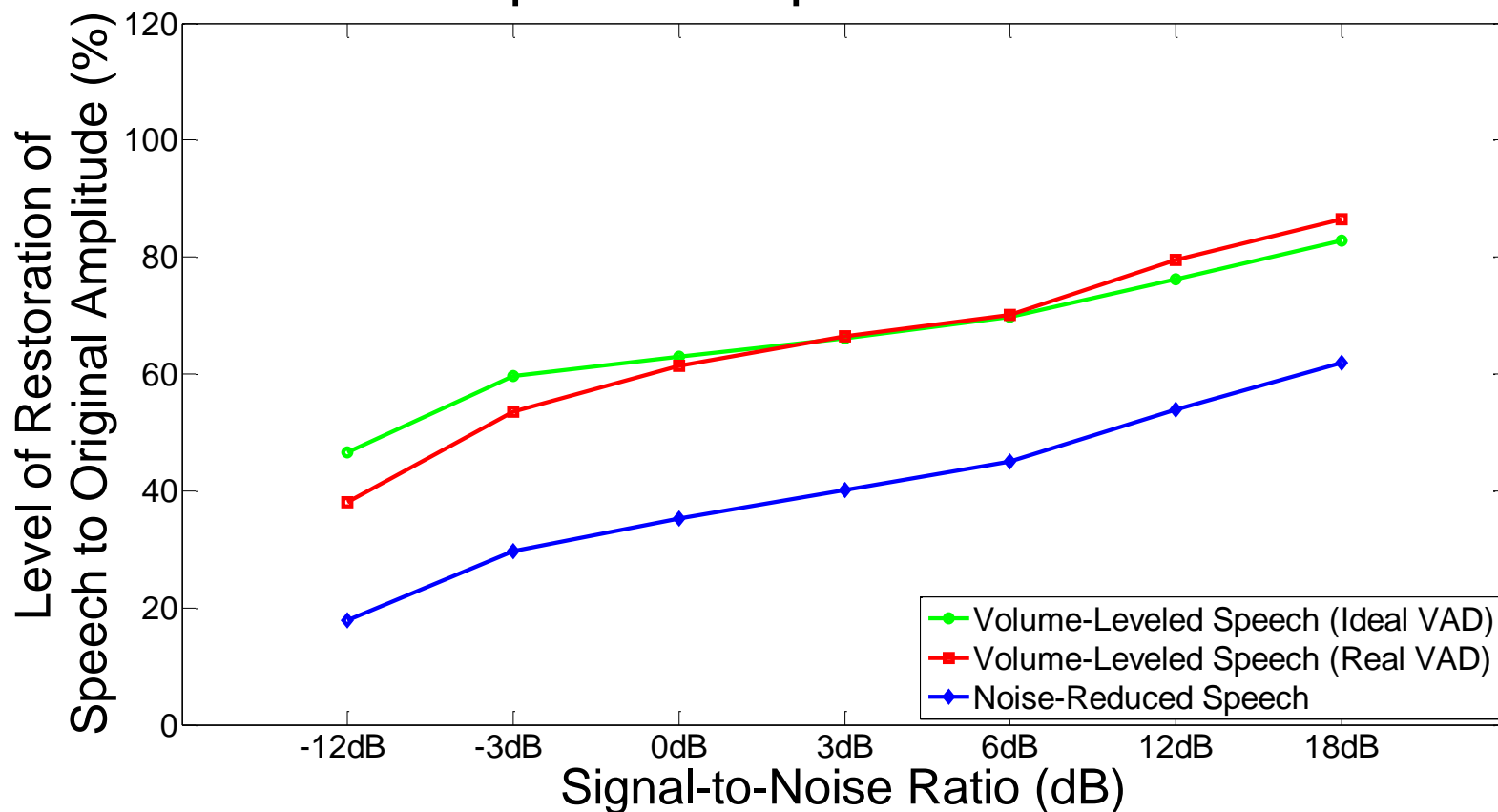
Using Real VAD





Volume Restoration

Percent of Original Speech Amplitude Attained





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Future Work

- Less reliance on VAD accuracy
- Incorporate coloring/timbre restoration
- Implement in a fast, low level language such as C

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