THE CCI-MOBILE VOCODER

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Cochlear Implant Laboratory

1. INTRODUCTION

- CCi-MOBILE research platform: enables flexible, on-the-go custom algorithm testing for individuals with cochlear implants (CIs), hearing aids (HAs), and/or hybrid (CI + HA) implants.
- Given acoustic speech input, HAs produce an acoustic output; whereas CIs produce an electric output which stimulates the auditory nerve.
- This enables testing of individuals with electric and acoustic stimulation (EAS) hearing.

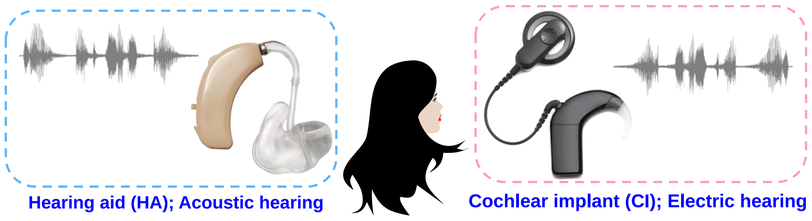

Fig. 1. A depiction of a person with bimodal hearing.

CCi-MOBILE[1]

1 Ali, H.Hong, F. Wang, J. Hansen, JHL (**2016**) Proc. Int. Conference on Cochlear Implants (CI2016), Toronto, Canada, 27.

2. SPECIFICATIONS

- **CCi-MOBILE** utilizes “n-of-m” ACE stimulation strategy (Cochlear Corp Ltd.) for CI users.
- Vocoder analyzes speech using a choice of 4, 8, or 16 filter banks and FIR or IIR filtering.
- Modulates speech with carrier signal: noise-band (white Gaussian noise) or center frequency sine-waves.
- Output: synthesized (vocoded) speech signal waveform, spectrogram, and audio file.
- Audio playback of original and vocoded speech signals allows for acoustic comparisons.
- Provides vocoded speech to HA-side and electric stimuli to CI-side stimulation for bimodal processing

5. CONCLUSIONS

- A vocoder with adjustable parameters was integrated with CCi-MOBILE to expand the flexibility of the research platform.
- This application will be made publicly available to the research community as an addition to the CCi-MOBILE software suite.

3. BLOCK DIAGRAM

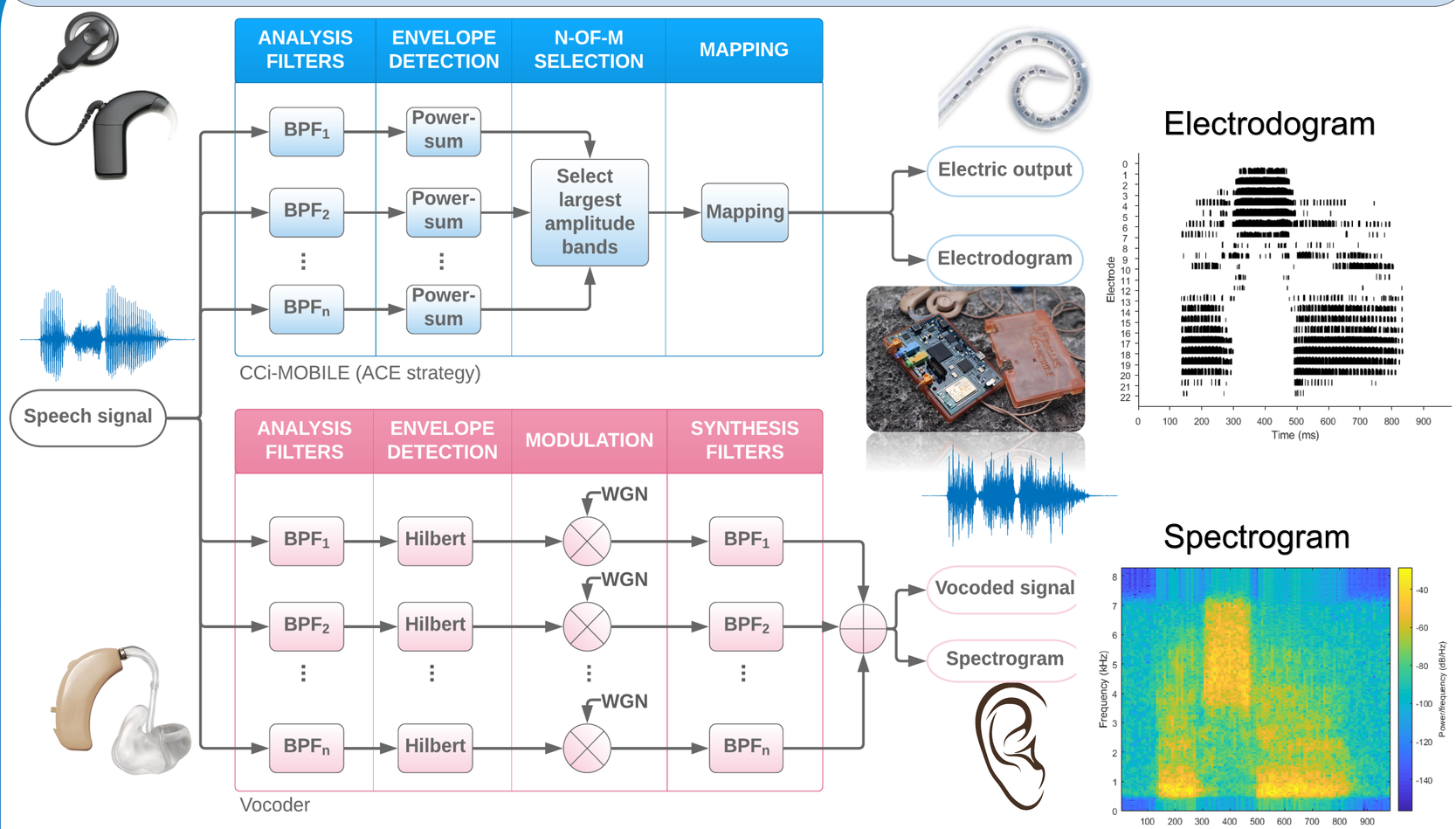

Fig. 2. Block diagram of **CCi-MOBILE** Vocoder depicting parallel processing of a speech signal by **CCi-MOBILE/**ACE and the vocoder using the noise-band method. The top process (blue) depicts the **CCi-MOBILE**/ACE strategy which produces an electric output and electrodogram; bottom process (pink) depicts the vocoder processing a speech signal which results in the vocoded signal and its spectrogram.

4. RESULTS

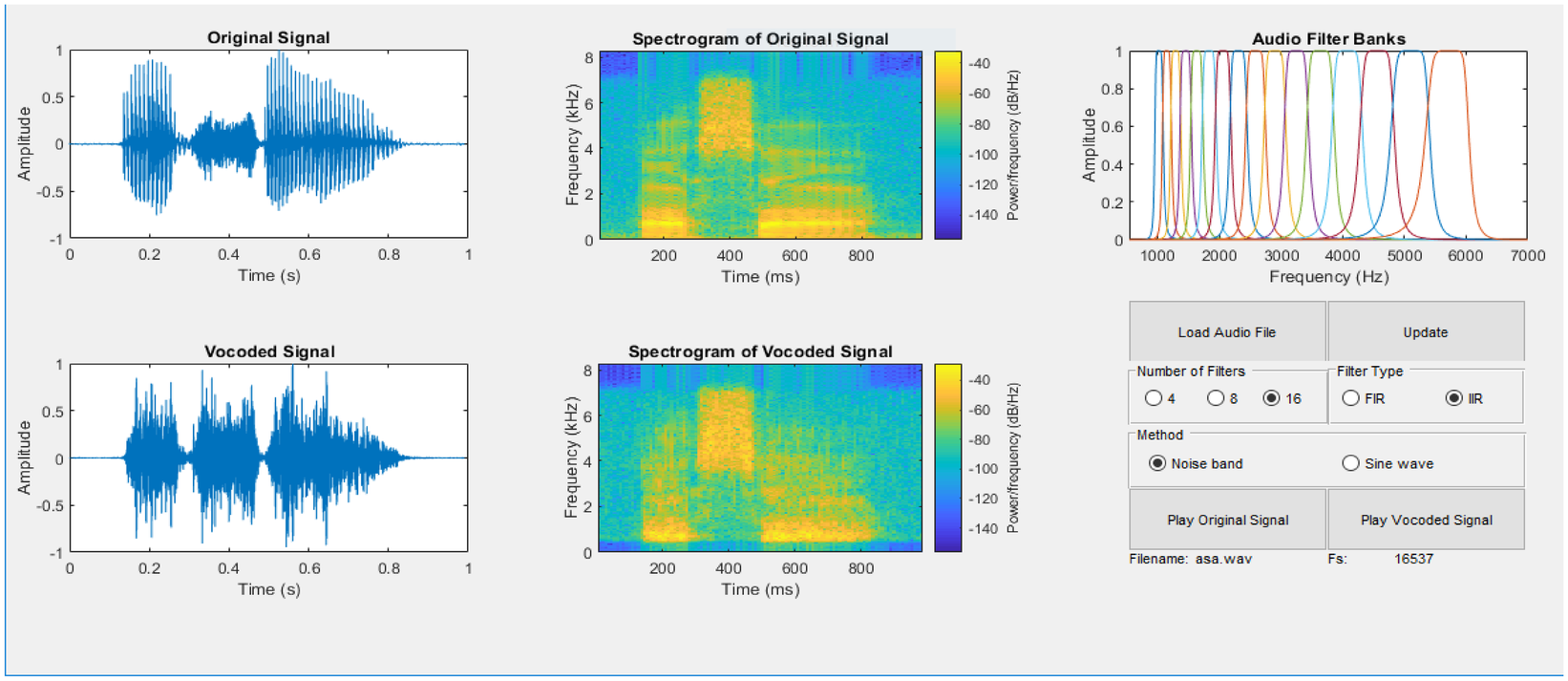

Fig. 3. The Vocoder GUI displays the waveforms and spectrograms for the original and vocoded speech signals. The number of filters, filter type, and vocoding method are adjustable, and the original and vocoded speech signals can be played back for acoustic comparison.

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