Signition Inc.

A Preprocessor for Speech Recognition Systems Operating in Noisy Environments

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Objectives:
The recognition of speech in noisy environments is critical to certain DoD systems now under development. Current preprocessors for speech recognition systems, such as those based on "linear predictive coding," are linear and therefore not effective in noisy environments. The objective of this project is to develop a nonlinear preprocessor for speech recognition systems that significantly improves the signal to noise ratio of the speech signal to be recognized. The nonlinear transmission line will be realized in software, although realization in hardware in FY91 should be possible. More specifically we will:
1) Develop a nonlinear transmission line preprocessor that accurately simulates the mechanics of the inner ear at all sound pressure levels.
2) Preprocess speech with the nonlinear transmission line and show that there is a substantial improvement in the signal to noise ratio.
3) Assess the desirability and feasibility of creating either a digital or analogue transmission line on a chip and using it as a preprocessor in the CMU, BBN, or MIT DARPA funded speech recognition systems.

Principles of nonlinear signal processing found in hearing may also be abstracted from their biological context and applied to the analysis of ocean acoustic and seismic signals.

Recent accomplishments:
A linear transmission line model of the inner ear was developed and used to "preprocess" speech recorded in a quiet environment. The output of this line makes the resonant modes of the vocal tract and the temporal waveform of its glottal excitation function apparent.

Work planned for FY89:
Nonlinear mechanisms found in the mechanics of hearing will be investigated and incorporated into the transmission line preprocessor.