Targeted Robust Audio Processing System - TRAP Project  
Sponsor DARPA, Partner IBM TJ Watson Research

The USC Signal Analysis and Interpretation Laboratory will conduct research and development on advanced technologies on robust Speech activity detection (SAD) and Language Identification. USC will also participate in evaluation of the technologies as instituted by the sponsor.

Speech processing in low signal-to-noise (SNR) condition is challenging depending on data recording and transmission conditions. As the spectral characteristics change from one type of sound to another, the way their acoustic properties change in low SNR depends on the type of sound and the spectral characteristics of the noise. We will improve and extend new techniques based on long term spectral analysis to improve speech activity detection. We will also develop and implement a number of machine learning methods to do the detection and classification, including designing effective fusion systems. Our approach for speech activity detection will attempt to reduce false alarms.

We will follow a multi system approach for creating the Language identification (LID) systems that model spoken language information at different levels and use score level fusion for combining sub-systems. In addition to the approaches prevalent in the state of the art, that we are addressing in Phase 1 that include: using phonotactic information, the introduction of shifted-delta-cepstral (SDC) acoustic features, using discriminative Maximum Mutual Information (MMI) training for acoustic and prosody feature modeling, we will develop new features and models including based on sparse representations.