Main Technologies

- MEMS microphone arrays
- Multiple sound source localization
- Multi-channel acoustic echo cancellation
- Blind source separation
- Multi-channel source enhancement
- Acoustic event detection and classification
- Acoustic feature extraction
- Distant speech recognition
- Adaptation to speaker and environment
- Keyword spotting and rejection strategies
- Speaker verification and identification
- Speech understanding
- Concurrent dialogue management
- Response generation and feedback to users

Expected Achievements

- Effective solution based on a low-cost microphone network in a multi-room environment
- Real-time multi-lingual prototypes and on-field evaluation
- Multi-channel corpora (speech/acoustic events)
- Improved quality of life for the end-users
- Pushing the frontiers of microphone array technologies
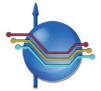
Other Application Contexts

- Ambient assisted living with elderly people
- Interaction with robots
- Immersive telepresence
- Environmental acoustic monitoring
- Security and surveillance
- Automotive telematics
- Gaming

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Distant-speech Interaction for Robust Home Applications

http://dirha.fbk.eu

Goals

The DIRHA project addresses the challenge of natural spontaneous speech interaction with an automated home environment using distant microphones.
Main fields of research are:

- multi-channel acoustic processing
- distant speech recognition and understanding
- speaker identification/verification
- spoken dialogue management

The project also aims to investigate the use of a new type of acquisition device consisting of MEMS (Micro Electrical-Mechanical System) digital microphone arrays.
The project addresses four languages: German, Greek, Italian and Portuguese. For comparison purposes, the English language will also be used.
The final real-time prototype will be integrated in automated homes and evaluated by motor-impaired end-users.

Main Challenges

- Variability of the acoustic scene in different home contexts
- Coherent acoustic scene analysis based on the microphone network distributed in the house
- Robustness to speaker position, environmental noise, multiple active sound sources
- Use of MEMS microphone arrays as alternative to off-the-shelf devices
- Always-listening system
- No push-to-talk system activation
- Speech recognition and understanding
- Mixed initiative dialogue system able to comprehend user's requests and preferences
- Real-time system response
- System design centered on real needs of motor-impaired end-users
- Full integration with automated home services, sharing the house status with DIRHA system

Late afternoon, Anna interacts with the system

Watercolour by Mirka Perseghetti