

# ICASSP 2013 EDICS

- 1: Audio and Acoustic Signal Processing
  - 1.1\*: Room Acoustics and Acoustic System Modeling
  - 1.2\*: Transducers
  - 1.3\*: Loudspeaker and Microphone Array Signal Processing
  - 1.4\*: Active Noise Control
  - 1.5\*: Echo Cancellation
  - 1.6\*: Auditory Modeling and Hearing Aids
  - 1.7\*: Source Separation and Signal Enhancement
  - 1.8\*: Spatial and Multichannel Audio
  - 1.9\*: Audio Coding
  - 1.10\*: Audio Analysis and Synthesis
  - 1.11\*: Content-Based Audio Processing
  - 1.12\*: Audio for Multimedia
  - 1.13\*: Network Audio
  - 1.14\*: Audio Processing Systems
  - 1.15\*: Bioacoustics and Medical Acoustics
  - 1.16\*: Music Signal Processing
  
- 2: Bio Imaging and Signal Processing
  - 2.1: Medical imaging
    - 2.1.1\*: Image formation
    - 2.1.2\*: Reconstruction and restoration
    - 2.1.3\*: Computed tomography (CT, PET or SPECT)
    - 2.1.4\*: Biomedical Imaging
    - 2.1.5\*: Magnetic resonance imaging
    - 2.1.6\*: Ultrasound imaging
  - 2.2: Medical image analysis
    - 2.2.1\*: Segmentation
    - 2.2.2\*: Registration
    - 2.2.3\*: Feature extraction and classification
  - 2.3: Bioimaging and microscopy
    - 2.3.1\*: Cellular and molecular imaging
    - 2.3.2\*: Deconvolution and inverse problems
    - 2.3.3\*: Segmentation and analysis
    - 2.3.4\*: Tracking and motion analysis
  - 2.4: Biomedical signal processing
    - 2.4.1\*: Physiological signals (ECG, EEG, ...)
    - 2.4.2\*: Detection and estimation

- 2.4.3\*: Feature extraction and classification
- 2.4.4\*: Multi-channel processing
- 2.5: Bioinformatics
  - 2.5.1\*: Genomics and proteomics
  - 2.5.2\*: Computational biology and biological networks

### 3: Image, Video, and Multidimensional Signal Processing

- 3.1: Image/Video Coding
  - 3.1.1\*: Still Image Coding
  - 3.1.2\*: Video Coding
  - 3.1.3\*: Stereoscopic and 3-D Coding
  - 3.1.4\*: Distributed Source Coding
  - 3.1.5\*: Image/Video Transmission
- 3.2: Image/Video Processing
  - 3.2.1\*: Image Filtering
  - 3.2.2\*: Restoration
  - 3.2.3\*: Enhancement
  - 3.2.4\*: Image Segmentation
  - 3.2.5\*: Video Segmentation and Tracking
  - 3.2.6\*: Morphological Processing
  - 3.2.7\*: Stereoscopic and 3-D Processing
  - 3.2.8\*: Image Feature Extraction
  - 3.2.9\*: Image Analysis
  - 3.2.10\*: Video Feature Extraction
  - 3.2.11\*: Video Analysis
  - 3.2.12\*: Modeling
  - 3.2.13\*: Biometrics
  - 3.2.14\*: Interpolation and Super-resolution
  - 3.2.15\*: Motion Detection and Estimation
- 3.3: Image Formation
  - 3.3.1\*: Remote Sensing Imaging
  - 3.3.2\*: Geophysical and Seismic Imaging
  - 3.3.3\*: Optical Imaging
  - 3.3.4\*: Synthetic-Natural Hybrid Image Systems
- 3.4: Image Scanning, Display, and Printing
  - 3.4.1\*: Scanning and Sampling
  - 3.4.2\*: Quantization and Halftoning
  - 3.4.3\*: Color Reproduction

- 3.4.4\*: Image Representation and Rendering
- 3.4.5\*: Display and Printing Systems
- 3.4.6\*: Image Quality Assessment
- 3.5: Image/Video Storage, Retrieval
  - 3.5.1\*: Image and Video Databases
  - 3.5.2\*: Image Indexing and Retrieval
  - 3.5.3\*: Video Indexing, Retrieval and Editing
  
- 4: Design and Implementation of Signal Processing Systems
  - 4.1\*: Algorithm and architecture co-optimization
  - 4.2\*: Compilers and tools for DSP implementation
  - 4.3\*: DSP algorithm implementation in hardware and software
  - 4.4\*: Low-power signal processing techniques and architectures
  - 4.5\*: Programmable and reconfigurable DSP architectures
  - 4.6\*: System-on-chip architectures for signal processing
  
- 5: Industry Technology Track
  - 5.1: DSP Chips and Architectures
    - 5.1.1\*: Mixed Signal Processing
    - 5.1.2\*: Special-Purpose and FPGA DSPs
    - 5.1.3\*: Host-Based Signal Processing
    - 5.1.4\*: Multiprocessor Architectures
  - 5.2: DSP Tools and Rapid Prototyping
    - 5.2.1\*: DSP Simulation Tools
    - 5.2.2\*: Rapid Prototyping and languages
    - 5.2.3\*: DSP Libraries
    - 5.2.4\*: Operating Systems
  - 5.3: Communication Technologies
    - 5.3.1\*: Cellular and Satellite Telephony
    - 5.3.2\*: Data Communications and Networking
    - 5.3.3\*: Software-Defined Radios
    - 5.3.4\*: Vocoder
    - 5.3.5\*: Power Line Communication
    - 5.3.6\*: RFID
  - 5.4: Speech Processing Applications
    - 5.4.1\*: Speaker Recognition
    - 5.4.2\*: Speech Compression
    - 5.4.3\*: Speech Enhancement

- 5.4.4\*: Speech Recognition
- 5.4.5\*: Speech Synthesis
- 5.5: Multimedia and DTV Technologies
  - 5.5.1\*: DSP Implementations of Music, Speech, and Audio
  - 5.5.2\*: Image and Video Applications
  - 5.5.3\*: Standards and Format Conversions
  - 5.5.4\*: Internet and Teleconferencing
- 5.6: Adaptive Interference Cancellation
  - 5.6.1\*: Smart Antennas
  - 5.6.2\*: Active Sound Reduction
  - 5.6.3\*: Acoustic and Electrical Noise and Echo Cancellation
  - 5.6.4\*: Hands-Free Telephony
- 5.7: Automotive Applications
  - 5.7.1\*: Intelligent Dashboards, Vehicles, and Highways (IVHS)
  - 5.7.2\*: Engine Management
  - 5.7.3\*: Route Planning and Tracking
  - 5.7.4\*: New Consumer Applications
- 5.8: Defense and Security Applications
  - 5.8.1\*: Optical Correlation
  - 5.8.2\*: Decluttering Target Identification and Tracking
  - 5.8.3\*: DSP-Based Cryptography, Stenography, and Watermarking
  - 5.8.4\*: Radar and Sonar
- 5.9: Emerging DSP Applications
  - 5.9.1\*: Biometrics
  - 5.9.2\*: Biomedical
  - 5.9.3\*: Power Systems and Motor Controls
  - 5.9.4\*: Machine Learning
- 5.10\*: Other ITT Topics

## 6: Information Forensics and Security

- 6.1: Watermarking and Steganography
  - 6.1.1\*: Theoretical models
  - 6.1.2\*: Algorithms
  - 6.1.3\*: Benchmarking and security analysis
  - 6.1.4\*: Steganography and steganalysis
- 6.2: Multimedia Forensics
  - 6.2.1\*: Sensor and channel forensics
  - 6.2.2\*: Tamper detection

- 6.2.3\*: Anti-forensics and countermeasures
- 6.2.4\*: Plagiarism and near-duplicate detection
- 6.2.5\*: Robust hashing
- 6.3: Biometrics
  - 6.3.1\*: Biometric methods and modalities
  - 6.3.2\*: Biometric security
  - 6.3.3\*: Performance and evaluation
- 6.4: Communications and Network Security
  - 6.4.1\*: Jamming and anti-jamming
  - 6.4.2\*: Covert or stealthy communication
  - 6.4.3\*: Secret key extraction from channels
  - 6.4.4\*: Information theoretic security
  - 6.4.5\*: Network attacks, protection and monitoring
- 6.5: Signal Processing and Cryptography
  - 6.5.1\*: Multimedia encryption
  - 6.5.2\*: Signal processing in the encrypted domain
  - 6.5.3\*: Traitor tracing codes
  - 6.5.4\*: Visual secret sharing
  - 6.5.5\*: Side channel attacks
  - 6.5.6\*: Privacy protection
- 6.6: Applications
  - 6.6.1\*: Surveillance
  - 6.6.2\*: Content protection, identification and monitoring
  - 6.6.3\*: Cloud and distributed computing systems
  - 6.6.4\*: Smart grid and power/energy systems
  - 6.6.5\*: Social media and network systems

## 7: Machine Learning for Signal Processing

- 7.1\*: Other applications of machine learning (MLR-APPL)
- 7.2\*: Bayesian learning; Bayesian signal processing (MLR-BAYL)
- 7.3\*: Cognitive information processing (MLR-COGP)
- 7.4\*: Distributed and Cooperative Learning (MLR-DIST)
- 7.5\*: Applications in Data Fusion (MLR-FUSI)
- 7.6\*: Graphical and kernel methods (MLR-GRKN)
- 7.7\*: Independent component analysis (MLR-ICAN)
- 7.8\*: Information-theoretic learning (MLR-INFO)
- 7.9\*: Learning theory and algorithms (MLR-LEAR)
- 7.10\*: Applications in Music and Audio Processing (MLR-MUSI)

- 7.11\*: Neural network learning (MLR-NNLR)
- 7.12\*: Pattern recognition and classification (MLR-PATT)
- 7.13\*: Bounds on performance (MLR-PERF)
- 7.14\*: Sequential learning; sequential decision methods (MLR-SLER)
- 7.15\*: Source separation (MLR-SSEP)
- 7.16\*: Applications in Systems Biology (MLR-SYSB)

## 8: Multimedia Signal Processing

- 8.1: Multimodal signal processing
  - 8.1.1\*: Joint processing/presentation of audio-visual information
  - 8.1.2\*: Synchronization of audio and visual data
  - 8.1.3\*: Fusion/fission of sensor information or multimodal data
  - 8.1.4\*: Integration of media, art, and multimedia technology
- 8.2: Virtual reality and 3D imaging
  - 8.2.1\*: 2D and 3D graphics/geometry coding and animation
  - 8.2.2\*: 3D audio and video processing
  - 8.2.3\*: Virtual reality and mixed-reality in networked environments
- 8.3: Multimedia communications and networking
  - 8.3.1\*: Wireless and mobile multimedia communication
  - 8.3.2\*: Media streaming, media content distribution, and storage
  - 8.3.3\*: Quality of service provisioning
  - 8.3.4\*: Cross-layer design for multimedia communication
  - 8.3.5\*: Overlay, peer-to-peer, and peer-assisted networking for multimedia
  - 8.3.6\*: Home networking for multimedia
  - 8.3.7\*: Location-aware multimedia computing
  - 8.3.8\*: Multimedia sensor and ad hoc networks
  - 8.3.9\*: Media compression and related standardization activities
  - 8.3.10\*: Multimedia watermarking
  - 8.3.11\*: Distributed source and source-channel coding
- 8.4: Multimedia security and content protection
  - 8.4.1\*: Data hiding
  - 8.4.2\*: Authentication
  - 8.4.3\*: Access control
  - 8.4.4\*: Single and multi-media security
  - 8.4.5\*: Multimedia forensics
  - 8.4.6\*: Security applications of watermarking and fingerprinting
- 8.5: Multimedia human-machine interface and interaction
  - 8.5.1\*: Human perception modelling

- 8.5.2\*: Modeling of multimodal perception
- 8.5.3\*: Human-human and human-computer dialog
- 8.5.4\*: Multimodal interfaces
- 8.5.5\*: Brain-computer interfaces
- 8.6: Quality Assessment
  - 8.6.1\*: Subjective visual quality assessment
  - 8.6.2\*: Objective visual quality assessment
  - 8.6.3\*: Subjective auditory quality assessment
  - 8.6.4\*: Objective auditory quality assessment
  - 8.6.5\*: Evaluation of user experience, cross-modal assessment
  - 8.6.6\*: Standardization activities
- 8.7: Multimedia databases and digital libraries
  - 8.7.1\*: Visual indexing, analysis and representation
  - 8.7.2\*: Audio indexing, analysis and representation
  - 8.7.3\*: Content-based and context-based information retrieval
  - 8.7.4\*: Knowledge and semantics in media annotation and retrieval
  - 8.7.5\*: Fingerprinting and duplicate detection
- 8.8: Multimedia computing systems and applications
  - 8.8.1\*: Multimedia system design
  - 8.8.2\*: Distributed multimedia systems
  - 8.8.3\*: Entertainment and gaming
  - 8.8.4\*: e-Health and telemedicine
  - 8.8.5\*: IP video/web conferencing
  - 8.8.6\*: e-learning
- 8.9: Hardware and software for multimedia systems
  - 8.9.1\*: Multimedia hardware design
  - 8.9.2\*: Real-time multimedia systems
  - 8.9.3\*: Implementations on graphics processing units (GPUs)
  - 8.9.4\*: Implementations on general-purpose processors, multimedia processors, DSPs, multi-core processors
  - 8.9.5\*: Implementations in portable/wearable systems
  - 8.9.6\*: Power-aware systems for multimedia
- 8.10: Haptic technology and interaction
  - 8.10.1\*: Processing and rendering of haptic signals
  - 8.10.2\*: Compression and transmission of haptic signals
  - 8.10.3\*: Audio-visual-haptic environments
  - 8.10.4\*: Multimedia applications using haptics
- 8.11: Bio-inspired multimedia systems and signal processing

- 8.11.1\*: Bio-inspired signal processing for multimedia
- 8.11.2\*: Multimodal signal fusion in humans and animals
- 8.11.3\*: Joint bio-inspired and conventional multimedia signal processing

## 9: Sensor Array and Multichannel Signal Processing

### 9.1: Sensor Array Processing

- 9.1.1\*: Beamforming
- 9.1.2\*: Physics-based sensor array processing
- 9.1.3\*: Inverse methods
- 9.1.4\*: Array calibration methods
- 9.1.5\*: Synthetic aperture methods
- 9.1.6\*: Signal detection and parameter estimation
- 9.1.7\*: Direction-of-arrival estimation
- 9.1.8\*: Source localization, separation, classification, and tracking
- 9.1.9\*: Blind source separation and channel identification

### 9.2: Adaptive Array Signal Processing

- 9.2.1\*: Adaptive beamforming
- 9.2.2\*: Space-time adaptive processing
- 9.2.3\*: MIMO radar and waveform diversity

### 9.3: Multi-channel Signal Processing

- 9.3.1\*: Channel modelling and equalization
- 9.3.2\*: Multi-channel transceiver design
- 9.3.3\*: Sparsity structures in multichannel signal processing
- 9.3.4\*: Multi-channel processing with non-wave based sensors
- 9.3.5\*: Tensor-based signal processing for multi-sensor systems

### 9.4: Multi-antenna and Multi-channel Signal Processing for Communications

- 9.4.1\*: MIMO systems and algorithms
- 9.4.2\*: Space-time coding and decoding algorithms
- 9.4.3\*: MIMO space-time code design and analysis
- 9.4.4\*: Multi-user MIMO networks
- 9.4.5\*: Array processing for wireless communications
- 9.4.6\*: Multi-antenna/multi-channel processing for cognitive radios

### 9.5: Sensor and Relay Networks

- 9.5.1\*: Sensor and relay network signal processing
- 9.5.2\*: Network beamforming and coding
- 9.5.3\*: Distributed and cooperative processing
- 9.5.4\*: Data fusion and decision fusion from multiple sensor types
- 9.5.5\*: Multi-Sensor processing for smart grid and energy systems



- 9.6: Applications of Sensor Array and Multi-channel Signal Processing
  - 9.6.1\*: Radar array processing
  - 9.6.2\*: Sonar array processing
  - 9.6.3\*: Microphone array processing
  - 9.6.4\*: Multi-channel imaging
  - 9.6.5\*: Multi-channel biological and medical modelling and processing
  - 9.6.6\*: Other applications of SAM signal processing

## 10: Signal Processing Education

- 10.1\*: Signal Processing Education

## 11: Signal Processing for Communications and Networking

### 11.1: Signal Transmission and Reception

- 11.1.1\*: Signal detection, estimation, separation and equalization
- 11.1.2\*: Channel modeling and estimation, training schemes
- 11.1.3\*: Capacity and performance analysis/optimization
- 11.1.4\*: Acquisition, synchronization and tracking
- 11.1.5\*: Signal representation, modulation, coding and compression
- 11.1.6\*: Joint source-channel coding and quantization, iterative decoding algorithms

### 11.2: Communication Systems and Applications

- 11.2.1\*: Multi-carrier, OFDM, and DMT communication
- 11.2.2\*: Multi-rate, CDMA and spread spectrum communication
- 11.2.3\*: Ultra wideband communication
- 11.2.4\*: Telephone networks, DSL and powerline communication
- 11.2.5\*: Applications involving signal processing for communication
- 11.2.6\*: Computation, Communication, and Control for Smart Grid
- 11.2.7\*: Communication/Networking Issues in Social Networks
- 11.2.8\*: Computation, Communication, and Control for Biological Networks
- 11.2.9\*: Underwater Communication Systems
- 11.2.10\*: Visible Light Communication Systems
- 11.2.11\*: Free Space Optical Communication

### 11.3: MIMO Communications and Signal Processing

- 11.3.1\*: MIMO precoder/decoder design, receiver algorithms
- 11.3.2\*: MIMO channel estimation and equalization
- 11.3.3\*: MIMO capacity and performance
- 11.3.4\*: MIMO space-time code design, analysis and decoding algorithms
- 11.3.5\*: MIMO multi-user and multi-access schemes

11.4: Communication and Sensing aspects of Sensor Networks, Wireless and Ad-Hoc Networks

- 11.4.1\*: Distributed and collaborative signal processing
- 11.4.2\*: Distributed channel and source coding, information-theoretic studies
- 11.4.3\*: Ad-hoc wireless networks
- 11.4.4\*: Physical layer issues, cross-layer design
- 11.4.5\*: Scheduling and queuing protocols
- 11.4.6\*: Power control, resource management, system level optimization
- 11.4.7\*: Cognitive Radio and Dynamic Spectrum Access
- 11.4.8\*: Collaborative Signal Processing for Smart Grid

12: Signal Processing Theory and Methods

12.1: Sampling and Reconstruction

- 12.1.1\*: Sampling theory and methods
- 12.1.2\*: Quantization
- 12.1.3\*: Extrapolation and interpolation
- 12.1.4\*: Signal reconstruction, restoration and enhancement
- 12.1.5\*: Multidimensional sampling and reconstruction

12.2: Signal and System Modeling, Representation and Estimation

- 12.2.1\*: System modeling
- 12.2.2\*: Signal and noise modeling
- 12.2.3\*: System identification and approximation
- 12.2.4\*: Multidimensional systems
- 12.2.5\*: Non-stationary signals and time-varying systems
- 12.2.6\*: Time-frequency and time-scale analysis
- 12.2.7\*: Blind and semi-blind source separation

12.3: Statistical Signal Processing

- 12.3.1\*: Detection and estimation theory and methods
- 12.3.2\*: Classification and pattern recognition
- 12.3.3\*: Cyclostationary signal analysis
- 12.3.4\*: Higher-order and fractional lower-order statistical methods
- 12.3.5\*: Performance analysis and bounds
- 12.3.6\*: Spectrum estimation theory and methods
- 12.3.7\*: Robust methods
- 12.3.8\*: Independent component analysis
- 12.3.9\*: Monte-Carlo based signal processing methods

12.4: Adaptive Signal Processing

- 12.4.1\*: Adaptive filter analysis and design

- 12.4.2\*: Fast algorithms for adaptive filtering
- 12.4.3\*: Frequency-domain and transform-based adaptive filtering
- 12.4.4\*: Sequential decision theory and methods
- 12.4.5\*: Performance analysis and bounds
- 12.4.6\*: Distributed and collaborative signal processing
- 12.5: Nonlinear Systems and Signal Processing
  - 12.5.1\*: Median, rank-order and stack type filters
  - 12.5.2\*: Non-Gaussian distribution filters
  - 12.5.3\*: Nonlinear signal and system models
  - 12.5.4\*: Nonlinear random process models
  - 12.5.5\*: Nonlinear adaptive filters
- 12.6: Filter Design
  - 12.6.1\*: Filter design criteria and optimization methods
  - 12.6.2\*: Filter architectures
  - 12.6.3\*: Performance analysis
- 12.7: Multirate Signal Processing
  - 12.7.1\*: Multirate architectures
  - 12.7.2\*: Filterbanks and wavelets
  - 12.7.3\*: Multirate processing and multiresolution methods
  - 12.7.4\*: Hierarchical models and tree-structured signal processing

### 13: Speech Processing

- 13.1: Speech Production (SPE-SPRD)
  - 13.1.1\*: Physical models of the vocal production system
  - 13.1.2\*: Singing and properties of the musical voice
- 13.2: Speech Perception and Psychoacoustics (SPE-SPER)
  - 13.2.1\*: Models of Speech Perception
  - 13.2.2\*: Hearing and Psychoacoustics
  - 13.2.3\*: Physiological models and applications thereof
  - 13.2.4\*: Audiology applications
- 13.3: Speech Analysis (SPE-ANLS)
  - 13.3.1\*: Spectral and other time-frequency analysis techniques
  - 13.3.2\*: Distortion measures
  - 13.3.3\*: Pitch/fundamental frequency analysis
  - 13.3.4\*: Timing/duration/speaking rate analysis
  - 13.3.5\*: Acoustic-phonetic features (e.g., formants etc)
  - 13.3.6\*: Extraction of non-linguistic information (e.g., gender, emotion, etc)
  - 13.3.7\*: Voice quality/speech disorders

- 13.4: Speech Synthesis and Generation, including TTS (SPE-SYNT)
  - 13.4.1\*: Segmental-Level and/or concatenative synthesis
  - 13.4.2\*: Signal Processing/Statistical Model for synthesis
  - 13.4.3\*: Articulatory Synthesis
  - 13.4.4\*: Parametric Synthesis
  - 13.4.5\*: Prosody, Emotional, and Expressive Synthesis
  - 13.4.6\*: Text-to-phoneme conversion
  - 13.4.7\*: Voice Quality
  - 13.4.8\*: Voice Transformation
  - 13.4.9\*: Audio/Visual speech synthesis
  - 13.4.10\*: Multilingual synthesis
  - 13.4.11\*: Quality assessment/evaluation metrics in synthesis
  - 13.4.12\*: Tools and data for speech synthesis
  - 13.4.13\*: Text processing for speech synthesis (text normalization, syntactic and semantic analysis)
- 13.5: Speech Coding (SPE-CODI)
  - 13.5.1\*: Narrow-band and wide-band Speech Coding
  - 13.5.2\*: Theory and techniques for signal coding (e.g., waveform, transform)
  - 13.5.3\*: Modulation and source/channel coding
  - 13.5.4\*: Quantization and compression
  - 13.5.5\*: Robust coding for noisy channels
  - 13.5.6\*: Voice Over IP (VOIP)
  - 13.5.7\*: Quality assessment/evaluation metrics (e.g., PESQ) in coding
- 13.6: Speech Enhancement (SPE-ENHA)
  - 13.6.1\*: Control and reduction of channel noise (e.g., reverb, room response)
  - 13.6.2\*: Perceptual enhancement of non-noisy speech
  - 13.6.3\*: Speech enhancement for humans with hearing impairments
  - 13.6.4\*: Non-acoustic microphones for enhancement
  - 13.6.5\*: Bandwidth expansion
  - 13.6.6\*: Noise Reduction
- 13.7: Acoustic Modeling for Automatic Speech Recognition (SPE-RECO)
  - 13.7.1\*: Feature Extraction
  - 13.7.2\*: Low-level feature modeling - Gaussians & beyond
  - 13.7.3\*: Pronunciation modeling at the acoustic level
  - 13.7.4\*: State clustering and novel state definitions
  - 13.7.5\*: Prosody and other speech characteristics
  - 13.7.6\*: Dialect, accent, and idiolect at the acoustic level
  - 13.7.7\*: Discriminative Acoustic Training Methods for ASR

- 13.7.8\*: Articulatory and physiological modeling
- 13.7.9\*: Feature Transformation and Normalization
- 13.8: Robust Speech Recognition (SPE-ROBU)
  - 13.8.1\*: Features specifically for robust ASR (noise, channel, etc)
  - 13.8.2\*: Model/backend based robust ASR
  - 13.8.3\*: Confidence measures and rejection
  - 13.8.4\*: Speech Activity/End-point/Barge-in detection
  - 13.8.5\*: Non-acoustic microphones for ASR
- 13.9: Speech Adaptation/Normalization (SPE-ADAP)
  - 13.9.1\*: Speaker adaptation and normalization (e.g., VTLN)
  - 13.9.2\*: Speaker adapted training methods
  - 13.9.3\*: Environmental/Channel adaptation
  - 13.9.4\*: Idiolect adaptation
  - 13.9.5\*: Register and/or dialect adaptation
- 13.10: General Topics in Speech Recognition (SPE-GASR)
  - 13.10.1\*: Distributed Speech Recognition - Client/Server methods
  - 13.10.2\*: Alternative Statistical/Machine Learning Methods (e.g., no HMMs)
  - 13.10.3\*: Word spotting
  - 13.10.4\*: Metadata (e.g., emotion, speaker, accent) extraction from acoustics
  - 13.10.5\*: New algorithms, computational strategies, data- structures for ASR
  - 13.10.6\*: Multi-modal (such as audio-visual) speech recognition
  - 13.10.7\*: Corpora, annotation, and other resources
  - 13.10.8\*: Algorithm approximation methods in ASR
  - 13.10.9\*: Structured classification approaches
- 13.11: Multilingual Recognition and Identification (SPE-MULT)
  - 13.11.1\*: Language (LID) and dialect (DID) identification
  - 13.11.2\*: Multilingual Speech recognition
  - 13.11.3\*: Processing of non-native accents
- 13.12: Lexical Modeling and Access (SPE-LEXI)
  - 13.12.1\*: Pronunciation modeling at the lexical level
  - 13.12.2\*: Dialect, accent, and idiolect at the lexical level
  - 13.12.3\*: Multilingual aspects (e.g., unit selection)
  - 13.12.4\*: Automatic lexicon learning
- 13.13: Large Vocabulary Continuous Recognition/Search (SPE-LVCR)
  - 13.13.1\*: Decoding algorithms and implementation
  - 13.13.2\*: Lattices
  - 13.13.3\*: Multi-pass strategies
  - 13.13.4\*: Miscellaneous Topics

- 13.14: Speaker Recognition and Characterization (SPE-SPKR)
  - 13.14.1\*: Features and characteristics for speaker recognition
  - 13.14.2\*: Robustness to variable and degraded channels
  - 13.14.3\*: Verification, identification, segmentation, and clustering
  - 13.14.4\*: Speaker characterization and adaptation
  - 13.14.5\*: Speaker recognition with speech recognition
  - 13.14.6\*: Speaker confidence estimation
  - 13.14.7\*: Multimodal and multimedia human speaker recognition
  - 13.14.8\*: Corpora, annotation, evaluation, and other resources
  - 13.14.9\*: Higher-level knowledge in speaker recognition
  - 13.14.10\*: Speaker localization (space) (e.g., in meetings)
  - 13.14.11\*: Speaker diarization (time) (e.g., in meetings)
  - 13.14.12\*: Speaker clustering (e.g., in Broadcast news)
- 13.15: Resource constrained speech recognition (SPE-RCSR)
  - 13.15.1\*: Low-power speech recognition
  - 13.15.2\*: Reduced computation speech recognition
  - 13.15.3\*: ASR techniques for highly portable/mobile devices

## 14: Spoken Language Processing

- 14.1: Spoken Language Understanding (SLP-UNDE)
  - 14.1.1\*: Semantic classification
  - 14.1.2\*: Entity extraction from speech
  - 14.1.3\*: Spoken document summarization
  - 14.1.4\*: Topic spotting and classification
  - 14.1.5\*: Question/answering from speech
  - 14.1.6\*: Paralinguistic (emotion, age, gender, rate, etc.) information
  - 14.1.7\*: Nonlinguistic (meaning external to language) information, gestures, etc.
  - 14.1.8\*: Detecting linguistic/discourse structure (e.g., disfluencies, sentence/topic boundaries, speech acts)
  - 14.1.9\*: Relation to and interpretation of sign language
- 14.2: Human Spoken Language Acquisition, Development and Learning (SLP-LADL)
  - 14.2.1\*: Language acquisition, development, and learning models
  - 14.2.2\*: Computer aids for language learning
  - 14.2.3\*: Attributes and modeling techniques for assessment of language fluency
- 14.3: Spoken and Multimodal Dialog Systems and Applications (SLP-SMMD)
  - 14.3.1\*: Spoken and multimodal dialog systems, applications, and architectures
  - 14.3.2\*: Stochastic Learning for dialog modeling
  - 14.3.3\*: Response Generation

- 14.3.4\*: Technologies for the aged
- 14.3.5\*: Evaluation metrics and standards
- 14.3.6\*: Speech/voice-based human-computer interfaces (HCI)
- 14.3.7\*: Speech HCI for individuals with impairments (blindness, etc.) and universal access (UA)
- 14.3.8\*: Other applications
- 14.4: Speech Data Mining (SLP-DM)
  - 14.4.1\*: Analysis, Tools, Evaluations, and Applications for mining spoken data
  - 14.4.2\*: Speech data mining theory, algorithms, and methods
  - 14.4.3\*: Mining heterogeneous speech and multimedia data
- 14.5: Speech Retrieval (SLP-IR)
  - 14.5.1\*: Spoken term detection
  - 14.5.2\*: Search/retrieval of speech documents
  - 14.5.3\*: Voice search
- 14.6: Machine Translation of Speech (SLP-SSMT)
  - 14.6.1\*: Semi-automatic and data driven methods
  - 14.6.2\*: Speech processing for MTS
  - 14.6.3\*: Corpora, annotation, and other resources
  - 14.6.4\*: Interlingua and transfer approaches
  - 14.6.5\*: Integration of speech and linguistic processing
  - 14.6.6\*: Machine transliteration for named entities
  - 14.6.7\*: Evaluation metrics (e.g., BLEU)
  - 14.6.8\*: Systems and applications for MTS
- 14.7: Language Modeling, for Speech and SLP (SLP-LANG)
  - 14.7.1\*: N-grams, their generalizations and smoothing methods.
  - 14.7.2\*: Language Model Adaptation
  - 14.7.3\*: Grammar based language modeling
  - 14.7.4\*: Maxent and feature based language modeling
  - 14.7.5\*: Dialect, accent, and idiolect at the language level
  - 14.7.6\*: Discriminative LM Training Methods
  - 14.7.7\*: Other approaches to LMs
  - 14.7.8\*: Structured classification approaches
- 14.8: Spoken language resources and annotation (SLP-REAN)
  - 14.8.1\*: General corpora, annotation, and other resources