Detailed List of Topics

LEVEL - 1	LEVEL - 2	TC
Signal Processing Theory and Methods		TC-SPTM
	Signal and system modeling	TC-SPTM
	Sampling theory	TC-SPTM
	Transforms	TC-SPTM
	Filtering	TC-SPTM
	Time-frequency and multiresolution analysis	TC-SPTM
	Estimation	TC-SPTM
	Detection and classification	TC-SPTM
	Bayesian signal processing	TC-SPTM
	Sparse and low-dimensional signal recovery	TC-SPTM
	Matrix and tensor factorization and completion	TC-SPTM
	Sparse and non-negative matrices and tensors	TC-SPTM
	Source separation	TC-SPTM
	Independent component analysis	TC-SPTM
	Subspace and manifold learning	TC-SPTM
	Tensor-based signal processing	TC-SPTM
	Adaptive signal processing	TC-SPTM
	Tracking	TC-SPTM
	Optimization methods	TC-SPTM
	Distributed optimization	TC-SPTM
	Graph signal processing	TC-SPTM
	Distributed signal processing theory and methods	TC-SPTM
	Distributed optimization	TC-SPTM
	Applications and other topics of signal processing theory and methods	TC-SPTM
Machine Learning in Signal Processing		TC-MLSP
	Supervised and semi-supervised learning	TC-MLSP
	Unsupervised learning	TC-MLSP
	Self-supervised learning	TC-MLSP
	Pattern recognition and clustering	TC-MLSP
	Performance analysis and bounds	TC-MLSP
	Reinforcement learning	TC-MLSP
	Deep learning models	TC-MLSP
	Deep learning training methods	TC-MLSP
	Deep generative models	TC-MLSP

Deep learning fairness and privacy	TC-MLSP
Transfer learning and meta-learning	TC-MLSP
Distributed and federated learning	TC-MLSP
Graph neural networks	TC-MLSP
Explainable and interpretable machine learning	TC-MLSP
Adversarial machine learning	TC-MLSP
Robust and trustworthy machine learning	TC-MLSP
Sustainable machine learning	TC-MLSP
Quantum machine learning	TC-MLSP
Graphical and kernel methods	TC-MLSP
Dictionary learning	TC-MLSP
Information theoretic learning	TC-MLSP
Bayesian machine learning	TC-MLSP
Sequential learning	TC-MLSP
Sparsity-aware learning	TC-MLSP
Feature extraction and selection	TC-MLSP
Machine learning applications for big data	TC-MLSP
Machine learning applications for wireless networks	TC-MLSP
Machine learning applications for communications	TC-MLSP
Machine learning applications for image and video processing	TC-MLSP
Machine learning applications for speech, music, and audio processing	TC-MLSP
Machine learning applications for time series analysis	TC-MLSP
Machine learning applications for multimodal data	TC-MLSP
Other applications of machine learning	TC-MLSP

Signal Processing for Communication	TC-SPCOM
Signal modulation and encoding	TC-SPCOM
Signal detection, estimation, demodulation and decoding	TC-SPCOM
Channel modeling and estimation	TC-SPCOM
Machine learning for communications	TC-SPCOM
Information theory	TC-SPCOM
Physical layer security	TC-SPCOM
MIMO and massive MIMO communication	TC-SPCOM
Low latency communication	TC-SPCOM
Energy aware communication	TC-SPCOM
Signal processing for networks and distributed systems	TC-SPCOM
Network resource allocation	TC-SPCOM
Edge, sensor and ad-hoc networks	TC-SPCOM
Cooperative networking / cognitive radio	TC-SPCOM
Distributed processing	TC-SPCOM
Machine learning over distributed networks	TC-SPCOM
Integrated sensing and communication	TC-SPCOM
Non-terrestrial communications	TC-SPCOM
Optical wireless communication	TC-SPCOM
Quantum communication	TC-SPCOM
Intelligent surfaces	TC-SPCOM

Other topics in signal processing for sensing and communication   TC-SPCOM

Sensor Array and Multichannel Signal Processing   TC-SAM

    Beamforming and source separation   TC-SAM
    Direction of arrival estimation and source localization   TC-SAM
    Array calibration   TC-SAM
    Tracking   TC-SAM
    Performance analysis and bounds   TC-SAM
    MIMO and massive MIMO array processing   TC-SAM
    Integrated sensing and communication   TC-SAM
    Remote sensing, radar and sonar signal processing   TC-SAM
    MIMO radar and waveform design   TC-SAM
    Sensor arrays for medical signal and image processing   TC-SAM
    Acoustic and microphone array processing   TC-SAM
    Geophysical and seismic signal processing   TC-SAM
    Non-wave based array processing   TC-SAM
    Intelligent surfaces   TC-SAM
    Other topics in signal processing for sensing and communication   TC-SAM

Biomedical Signal and Image Processing   TC-BISP

    Medical image formation, reconstruction and restoration   TC-BISP
    Medical image analysis   TC-BISP
    Multimodal medical image fusion and analysis   TC-BISP
    Biological image formation, reconstruction and restoration   TC-BISP
    Biological image analysis   TC-BISP
    Physiological and wearable signal processing   TC-BISP
    Neural signals   TC-BISP
    Brain/human-computer interfaces   TC-BISP
    Bioinformatics   TC-BISP
    Applications and emerging methods in biomedical image and signal processing   TC-BISP

Image, Video and Multidimensional Signal Processing   TC-IVMSP

    Image and video sensing and acquisition   TC-IVMSP
    Statistical-model based methods for image and video   TC-IVMSP
    Structural-model based methods for image and video   TC-IVMSP
    Image and video representation   TC-IVMSP
    Perception and quality models for images and video   TC-IVMSP
    Biomedical and biological image processing   TC-IVMSP
    Machine learning for image and video processing   TC-IVMSP
    Image and video coding   TC-IVMSP
    Imaging and video networks   TC-IVMSP
    Image and video processing for watermarking and security   TC-IVMSP
    Image and video multimedia communications   TC-IVMSP
    Machine learning for image and video communication   TC-IVMSP

Image and video content analysis	TC-IVMSP
Image and video storage and retrieval	TC-IVMSP
Image and video synthesis, rendering, and visualization	TC-IVMSP
Three-dimensional image and video analysis and processing	TC-IVMSP
Stereoscopic and multiview processing, display and coding	TC-IVMSP
Image scanning and capture	TC-IVMSP
Color and multispectral imaging	TC-IVMSP
Scanned document analysis, processing, and coding	TC-IVMSP
Hardware and software systems for image and video processing	TC-IVMSP
Applications and other topics in image, video and multidimensional signal processing	TC-IVMSP

Computational Imaging	TC-CI
Computational imaging methods and models	TC-CI
Sparse, low-rank, and low-dimensional models for computational imaging	TC-CI
Machine learning-based methods for computational imaging	TC-CI
Computational imaging modalities	TC-CI
Computational photography	TC-CI
Computational imaging hardware and algorithms	TC-CI
Applications and other topics in computational imaging	TC-CI

Multimedia Signal Processing	TC-MMSP
Multimedia synthesis and rendering	TC-MMSP
Frugal and green multimedia	TC-MMSP
Multi-modal processing and analysis	TC-MMSP
Machine/deep learning methodologies for multimedia	TC-MMSP
Generative/Large multi-modal models	TC-MMSP
Multimedia understanding	TC-MMSP
Multimedia compression, transmission and security	TC-MMSP
Immersive and 3D multimedia processing and coding	TC-MMSP
Quality of experience	TC-MMSP
Multimedia information retrieval and datasets	TC-MMSP
Applications in multimedia (healthcare, education, art, distributed multimedia, etc.)	TC-MMSP
Multimedia perception and processing for autonomous systems	TC-MMSP

Information Forensics and Security	TC-IFS
Applied cryptography	TC-IFS
Watermarking and data hiding	TC-IFS
Anonymization and data privacy	TC-IFS
Multimedia forensics	TC-IFS
Machine learning for information forensics and security	TC-IFS
Adversarial machine learning	TC-IFS
Biometrics	TC-IFS
Cybersecurity	TC-IFS

Hardware security	TC-IFS
Network security	TC-IFS
System security	TC-IFS
Communication and information theoretic security	TC-IFS
Surveillance	TC-IFS
Applications and other topics in forensics and security	TC-IFS

Audio and Acoustic Signal Processing	**TC-AASP**
Signal enhancement, restoration, and extraction	TC-AASP
Audio and speech source separation	TC-AASP
Audio and speech coding, transmission, and representations	TC-AASP
Audio and speech quality and intelligibility measures	TC-AASP
Auditory modeling and hearing instruments	TC-AASP
System identification and dereverberation	TC-AASP
Acoustic sensor array processing	TC-AASP
Fundamental theory and algorithms for audio and acoustic signal processing	TC-AASP
Audio captioning, retrieval, and understanding	TC-AASP
Sound event and anomaly detection and sound scene classification	TC-AASP
Sound generation and synthesis	TC-AASP
Modeling, analysis, and synthesis of acoustic environments	TC-AASP
Spatial audio recording and reproduction	TC-AASP
Active noise control; acoustic echo and feedback cancellation	TC-AASP
Music analysis	TC-AASP
Music signal processing, production, and separation	TC-AASP
Audio- and symbolic-domain music generation and content creation	TC-AASP
Bioacoustics and medical acoustics	TC-AASP
Audio security	TC-AASP
Audio for video and multimedia	TC-AASP
Data and open source for audio and acoustic signal processing	TC-AASP

Speech and Language Processing	**TC-SLP**
Discourse and dialog	TC-SLP
Language understanding and computational semantics	TC-SLP
Spoken document retrieval and summarization	TC-SLP
Segmentation, tagging, and parsing of language	TC-SLP
Summarization, retrieval and language learning	TC-SLP
Machine learning for NLP	TC-SLP
Generation in NLP	TC-SLP
Question answering	TC-SLP
Multi-modal/cross-modal speech and language processing	TC-SLP
Speaker diarization and identification	TC-SLP
Speaker verification	TC-SLP
Speaker anti-spoofing	TC-SLP
Speech enhancement and extraction	TC-SLP
Speech event detection	TC-SLP

Speech emotion recognition	TC-SLP
Speech/singing voice conversion and cloning	TC-SLP
Text-to-speech generation	TC-SLP
Neural vocoder and codec	TC-SLP
Audio/music/singing voice generation	TC-SLP
Watermarking and anti-spoofing	TC-SLP
Speech processing resources	TC-SLP
Speech recognition	TC-SLP
Multilingual speech recognition and identification	TC-SLP
Multi-talker speech recognition	TC-SLP
Speech modeling for speech recognition	TC-SLP
Adaptation and customization for speech-to-text	TC-SLP
Machine translation of spoken/written language	TC-SLP

Applied Signal Processing Systems	TC-ASPS
Quantum and quantum-inspired signal processing	TC-ASPS
Neuromorphic computing	TC-ASPS
Edge and embedded computing	TC-ASPS
Energy-aware computing	TC-ASPS
Hardware accelerators	TC-ASPS
Resource-efficient machine learning	TC-ASPS
Signal processing and generative AI systems	TC-ASPS
Processing-in-memory signal processing systems	TC-ASPS
Autonomous systems	TC-ASPS
IoT	TC-ASPS
Robotics	TC-ASPS
Radar, sonar and acoustic systems	TC-ASPS
Safe and trustworthy systems	TC-ASPS
Applications of generative AI and foundation models	TC-ASPS
Other emerging topics in signal processing systems	TC-ASPS

Signal Processing Education	SPEB
Curriculum development	SPEB
Resouces and tools for signal processing education	SPEB
Pedagogical models for signal processing education	SPEB
Case studies in signal processing education	SPEB