IEICE General Conference 2018 Group

A: Engineering Sciences Society  Click here to see details.

N: NOLTA Society  Click here to see details.
N-1. Nonlinear Problems / N-2. Complex Communication Sciences

B: Communications Society  Click here to see details.

C: Electronics Society  Click here to see details.

D: Information and Systems Society  Click here to see details.
A: Engineering Sciences Society

A-1. Circuits and Systems

A-2. Information Theory
Shannon theory, fundamental mathematics for information theory, source coding, data compression, image coding, speech coding, channel coding, storage coding, error-correcting code and error-detecting code, coded modulation, multi-user information theory, stochastic processes, hypothesis testing and parameter estimation, large deviation theory, control theory, combinatorics, cryptography, information security, signal theory, signal processing, communication systems, intelligent information processing and inference engine, quantum information theory, optical communication theory, applications of information theory, genetic codes.

A-3. Reliability

A-4. Ultrasonics
ultrasonic transducer, bulk waves, surface acoustic waves, elastic vibration, vibration measurements, medical ultrasonic, biological effects by ultrasound, acoustic microscope, ultrasonic sensor, vibratory gyroscope, high-power ultrasound, underwater acoustics, physical acoustics, sonochemistry, piezoelectric device, ultrasonic spectroscopy, piezoelectric materials, ultrasonic sensing, nondestructive inspection, nonlinear acoustics, ultrasonic actuator, acousto-optic interaction

A-5. Engineering Acoustics

A-6. VLSI Design Technologies

A-7. Information Security
A-8. Signal Processing


A-9. Wide Band Systems

Spread spectrum(SS), Orthogonal frequency division multiplexing(OFDM), Ultra wide band (UWB), Theory of code sequence design (construction method of spreading code, error correcting code, etc.), Wide band system design/evaluation theory (system design for any applications, comparison and evaluation to other systems, etc.), Modulation & demodulation techniques and theories (modulation & demodulation methods, circuits, devices, multi-carrier transmission, time-space signal processing, etc.), Synchronization systems/ devices (carrier synchronization, code acquisition & tracking, synchronization circuits, synchronization methods, synchronization devices, etc.), Multiple access techniques (CDMA, SDMA (space division multiple access), TDMA, FDMA, and hybrid techniques, etc.), Radio propagation and antennas related with WBS (propagation, analysis of transmission characteristics, antenna techniques, input-output interface techniques, etc.), Application areas (public communication, personal communication, wireless LAN, power line transmission, consumer communication, multi media communication, ITS (intelligent transport systems), distance measurement, software radio, optical CDMA, optical space processing, quantum communication, chaos communication, digital broadcasting, wireless communication, wired communication, xDSL, and UWB based on wide band techniques), and other boundary areas to apply the same principle and phenomenon.

A-10. Mathematical Systems Science and its Applications

Basic theory on mathematical systems science (graphs, Petri nets, networks, concurrent systems, system optimization, multi-agent systems, hybrid systems, distributed systems, game theory, discrete event systems), mathematics on system design and verification (formal modeling, formal verification, diagnosis, performance evaluation, simulation, fault tolerance), mathematics on cyber-physical systems (embedded systems, networked control, sensor networks, cooperative control, real-time systems), mathematics on human factors (modeling and analysis on human activity, business process, service science), applications (workflow, elevator control, manufacturing scheduling, AGV control, on-demand bus control, design of large-scale software), new approaches (open system science, systems biology), artificial intelligence (machine learning, discrete and continuous optimization theory) other approaches on theory and application of mathematical systems science.

A-11. Thought and Language

Observation, analysis, formulation, and modeling of thought processes and brain function, acquisition and performance of language and knowledge, production and understanding of paralinguistic information and its role, theory and support technology of smooth communication (universal design, intelligent network, contents creation, etc.), knowledge processing and computer aided systems (intelligent CAD, intelligent search, decision making, etc.), education systems (CAI, composition support, etc.)

A-12. Technology, Society, and Ethics

Information communication and ethics, Information oriented society and metamorphosis of the human, Privacy and protection of the personal information, Information security and ethics, Intellectual property, Ethics, Ethics for medical information, Digital divide.

A-13. Safety

Principle of safety, safety certification, reliability and safety, safety criterion, safety integrity, safety integrity level, safety index, safety device, safety-instrumented system, equipment safety, system safety, safety related-system, safety-instrumented system, safety assessment, tolerable risk, risk management, risk assessment, risk sharing, risk transfer, risk perception, risk analysis and assessment, situation awareness, human error, human factor, human-computer interaction, human-machine system, fail-safe, transportation safety, occupational safety, environmental safety, medical safety, machinery safety, product safety, product liability prevention, crisis management, predictability, functional safety, plant safety, standard-related, safety of medicines and food, safety-information network, software safety, medical treatment, biological treatment, chemical safety, ergonomics-related safety, cognitive safety assessment, probabilistic safety assessment, safety
A-14. ITS

General research on social activities with ITS, general research on ITS related services, ITS communication technology (road-to-vehicle communication, inter-vehicle communication, ETC, beacon, mm-wave communication, network architecture and so on), ITS electronics technology (car navigation system, IC card, automatic driving system, automatic vehicle system and so on), ITS infrastructure technology (traffic management, traffic surveillance, vehicle guidance, emergency car support and so on), ITS technologies for aviation, maritime and land transportation (aviation, maritime and rail related ITS technologies and so on), ITS sensing technology (positioning, ranging, image sensing, traffic detection & surveillance, obstacle detection & surveillance and so on), ITS vision technology (image recognition, traffic flow measurement, incident detection & surveillance and so on), ITS information technology (geographic information system (GIS), travel information, architecture information, automatic vehicle control, vehicle control learning, electronic payment and so on), any other researches related to ITS.

A-15. Smart Info-media System

Smart mobile system (smart personal system, personal information system, smart home electronics, personal human interface), Soft computing (neuro-fuzzy system, evolutilional system, adaptive system to environment, human adaptive system), Intelligent multimedia processing system (adaptive media processing, nonlinear media processing, media recognition system, kansei information processing), System on silicon (ultrahigh-speed media system, micro information processing system, media system with highly low-power consumption, ubiquitous system), Near field radio communication application system including RFID (hardware, system, application)

A-16. Image Media Quality

[Fundamentals for image quality assessment]
Generalized image evaluation models for imaging media, Psycho-physical model, Measure theory for image quality assessment, Measurement theory for image quality assessment, Subjective evaluation method, Image information characteristic analysis, Observation environment and visual characteristic
[Medium-oriented image evaluation assessment theories]
Capture medium, Communication medium, Broadcasting medium, Storage medium, Error evaluation for image coding theories, Display medium, Printing medium, Computer Graphics, Virtual reality, Mixed Reality
[System for image quality evaluation]
Evaluation software, Evaluation hardware, Evaluation system

A-17. Reliable Communication and Control

Reliable remote control/wireless control, Networked control, M2M (Machine-to-Machine), IoT (Internet of Things), Distributed control for multi-agent systems, Control system design for large-scale/hybrid/stochastic/time-delay systems, Fundamental theory for reliable remote control (information theory, modulation and demodulation theory, coding theory, network theory, signal processing, algorithm, artificial intelligence, machine learning, etc.), Applications (manufacturing line/plant, energy network, medical welfare, transportation systems, architectural construction, urban design, disaster preparedness, crime prevention, defense, etc.), Research, development, rule making, industrialization, and realization on topics in the above multi- and interdisciplinary areas.

A-18. Biometrics


A-19. Information and Communication Technologies for Safe and Secure Life

Information and Communication Technologies for Safe and Secure Life (Ad-hoc networks construction technologies, Congestion control technologies, Reliable wireless access technologies, Delay tolerant network technologies, Broadband radio transmission technologies, Network system design technologies, Facility location design technologies, ITS (intelligent transport systems) technologies, sensor network technologies, GIS (Geographical information systems) technologies, etc.), Researches in social science for Safe and Secure Life (Disaster informatics, Behavioral disaster management, Disaster resilience, Service sciences etc.), Maintenance, management and operation technologies in the social infrastructure (Communication networks, Electric power networks, Highway.
road networks, railroad networks, etc.)

H-1. Human communication science

Communication theory, Media theory, Information-based semantics theory, Advanced information theory, Human model, Human error, Interaction model, Creativity and thinking support environment, Collaborative work support environment, Communication support for disabled/aged people, Nonverbal communication), Psychology • Behavioral science • Social psychology • Organizational theory

H-2. Human information processing

Human interface technology, Man-machine interaction, Multi-modal interface/information processing, Kansei/affective information processing, Emotion expression and recognition, Measurement and analysis of human factors, Human information processing, Visual and auditory information processing, Analysis and modeling of human vision system, Perception and cognition in real/virtual environment, Bio-signal processing technology and analysis, Bio-behavior understanding and synthesis

H-3. Media Experience and Virtual Environment

intelligent communication technology(intelligent coding, knowledge-based communication, communication for understanding meaning/intention), artificial reality technology (artificial reality, virtual environment, cyber interface, media arts), presence communication (3D communication, wide view communication, five-sense communication, spatial operation) media processing (multimedia understanding /transformation /archive /process/synthesis, integrated multimedia coding, multimedia interface, hypermedia, mobile multimedia, agent), Cooking Media (ubiquitous cooking support, analysis of cooking video, cooking archiving and food log, recipe recommendation, recipe text processing, food communication).

H-4. Welfare Information Technology

N-1. Nonlinear Problems


N-2. Complex Communication Sciences

Communications and network applications with nonlinear sciences, complex sciences, and graph theory, and network theory, Sciences of bio-systems, communication systems, wireless communications, information networks, mobile networks, radar and tomography measurements, and power networks, Nonlinear sciences, complex sciences, and bio-system sciences using network-research-field theories, Sciences and applications of distributed optimization, Physical random number generators and security,
B: Communications Society

B-1A. Antennas and Propagation A (Electromagnetic Wave Propagation and Applications Except for Communications)
Radio and optical wave propagations, Diffractions and scatterings, Mobile propagations, Indoor propagations, Propagations in troposphere and ionosphere, wireless power transmission, Radio telemetry and remote sensing, Measurement of electromagnetic compatibility.

B-1B. Antennas and Propagation B (Antennas - general)
Antenna theories, Antenna elements, Array antennas, Aperture antennas, Millimeter-wave antennas, Small antennas, Design and analysis methods of antennas, Human body effect.

B-1C. Antennas and Propagation C (Antenna Systems)
Antenna measurements, Feeding circuits, Adaptive antennas, MIMO antenna systems, DOA estimation, Radio- and optical-fused techniques.

B-2. Space, Aeronautical and Navigational Electronics

[Satellite technology]
Satellite system, satellite subsystem and component, development and exploitation of satellite mission equipment, small satellite, space station, on-orbit service, attitude and orbit control

[Electronic and radio-wave application system]
Radar, ranging and positioning, time standard, micro-wave and optical communication, data relay, tracking, telemetry command, energy transmission

[Remote sensing]
Earth and scientific observation system, technique related with disaster prevention, sensor, equipment for data processing, recording, and transmission

[Navigation and traffic control]
Satellite positioning, GNSS, GPS, QZSS, pseudolite, air and road traffic control, location-based services

B-3. Satellite Communications

[Satellite communications and broadcasting systems]
Fixed satellite communication systems, Mobile/Maritime/Aeronautical satellite communication systems, Broadcasting satellite systems, Inter-satellite communication systems, Geostationary orbit systems, Non-geostationary orbit systems, Frequency sharing technologies, Interference mitigation techniques

[Hardware for satellites and earth stations]
On-board equipment, Earth station equipment, Mobile terminals

[Satellite application systems]
Satellite-ground integrated communication system, Satellite-ground complementary systems, Remote learning and remote medicine, Disaster countermeasures and preventions, Digital divide provisions, Satellite internet, Satellite sensor networks, System cost analysis, UAS and ocean relay communication link

[Elementary technologies for communications]
Modulation and demodulation technologies, Coding technologies, Optical communication technologies, Access methods, Error correction methods, Security technologies, Communication protocols, Satellite based positioning

[Control and management methods]
Network control and management methods, Resource control and management methods, Satellite orbit and attitude control

B-4. Electromagnetic Compatibility

[EMC Countermeasures and EMC design techniques]
Transmission line, EMC design of electronic circuit, PCB (Printed circuit board), Circuit analysis and design, Near/Far field analysis, Probes, Electromagnetic coupling, Matching circuit

[EMC measurement techniques and International standards]

[EMC materials and biological effect of EM fields]
EM absorber, Shielding and gasketing, Filters, Sensors, Material constants, EMC applications of metamaterial, SAR, Medical applications

[EMC problems in communication systems]
PLC (Power line communications), Wireless LAN, PDA (Personal Digital Assistants), Signal integrity, Communication Error, Cables, Connectors, Broadband EMI
[Discharge noise and others]
ESD (Electrostatic discharge), Electrical contacts, Surge, Transients, Lightning, Man-made noise, Natural noise, Estimation of source location

**B-5A. Radio Communication system A (mobile communication)**

Wireless communication theory, Wireless transmission technology, Wireless access technology, Wireless networking technology, Wireless communications standardization/implementation technology.

**B-5B. Radio Communication system B (Wireless access networks)**

Wireless communication theory, Wireless transmission technology, Wireless access technology, Wireless networking technology, Wireless communications standardization/implementation technology.

**B-6. Network Systems**

[Network Architecture]
[Network System Technology]
[Network Control and Protocols]
Routing, Multicast, Application Level Control, Session and VoIP control, Flow and Queuing Control, Cross Layer Control, Wired and Wireless LAN Protocol, Traffic Engineering, TCP/IP
[Network Application Enablers]
[Network Quality and Management]

**B-7. Information networks**

[Information Network Architecture]
Overlay Network/P2P, IPv6, Next Generation Network (NGN)/New Generation Network (NWGN), Ad-hoc Sensor Network (MANET), Home Area Network (HAN), Mobile Network, SDN. Cloud Networking
[Information Network Service and Applications]
Contents Delivery/Contents Exchange, Virtual Private Network (VPN), Web Service/SOA/ROA Platform, Social Networking Service (SNS), Authentication/Identity Management, Green/Energy Saving ICT, Data Analysis/Processing Platform
[Network QoS, Traffic Theory, Performance Analysis]
Multicast, Routing, Performance Analysis and Simulation, Traffic and Throughput Measurement, Self-organized/Distributed Control, Network Coding/Network Algorithms, Quality of Service (QoS) Control, TCP
[Network Control, Operation and Management]
Congestion Control, Network Configuration Management, OpenFlow, Traffic/Flow Control, Session Management (SIP/IMS), Networking Technologies for Mobile Terminal Control, M2M communication management, Contingency Plan/BCP
[Information Network Architecture]
Overlay Network/P2P, IPv6, Next Generation Network (NGN)/New Generation Network (NWGN), Ad-hoc Sensor Network (MANET), Home Area Network (HAN), Mobile Network, SDN. Cloud Networking

**B-8. Communication System**

[Transport technology]
Broadband access, Packet transport, Power line communication, Optical transport, Ultra-high-speed transport, Multiplexing, and Synchronization.
[Modulation, coding and signal processing]
Modulation/demodulation, Error detection/correction coding, Signal coding, Digital signal processing, Digital signal processor, and Network coding
B-9. Energy Engineering in Electronics and Communications

[Power device]
Semiconductor device, Magnetic device, Electric double layer capacitor, Piezoelectric device, Microelectronic application
[Power conversion equipment]
DC-DC converter, Rectifier, Inverter, Active filter, Soft switching, New power converter circuit and control technology
[Power system]
Power supply system, Uninterruptible power supply system, Downsizing/High-density/Integration, Packaging/cooling technology, Measurement/Analysis/Simulation, Reliability, Electromagnetic compatibility, New industrial and home use power supply
[Energy system]
Photovoltaic power generation, Fuel-cell power generation, Wind-power generation, Energy transmission and supply system, Energy saving system, Superconductivity, Heat utilization technology, Hydrogen energy utilization technology
[Battery]
High-energy density, Long-life operation, High reliability, Maintenance and management technology

B-10A. Optical Communication Systems A (Optical Fibers)

[Optical Fibers]
Telecom Optical Fibers, Optical Fiber Cords/Cables, Specialty Optical Fibers, Space Division Multiplexing (SDM) Optical Fibers, Optical Connecting techniques/Optical, Connectors/Wiring techniques, Optical Interconnection, Optical Fiber Operation, Administration, and Maintenance (OAM), Optical Fiber Measurement techniques


[Optical Communication System]

[Optical Communication Equipment]
Optical Amplifiers and Optical Repeaters, Optical/Electrical Cross Connect and OADM, Optical/Electrical Multiplexing and Demultiplexing, Optical Transceivers, Optical Terminals, Digital Signal Processing and Error Correction, Optical Communication Measurement, Optical Communication Equipment for Datacom

[Device Application to Optical Communication Systems]
[Optical Communications Network/Specification]

B-11. Communications Quality

[Optimization and Control of QoE/QoS]
Game Theory, Data Mining, Personalization and Environmental Adaptation of Service, Network Control Considering QoE, Communication Behavior Model and Behavior Modification, Resource Allocation Optimization for Social Infrastructure, QoE and Business Model, User Engagement
Evaluation and Measurement of QoE/QoS

Subjective/Objective Evaluation, QoE Estimation Model, Psychological Assessment, Biological Information Measurement, Realistic/Ultra-Realistic, Usability, Crowdsourcing, Quality Visualization

Performance of Information and Communication Services


Network Performance

Network Performance Indicator (KPI), Quality Measure and Standardization, Traffic Measurement/Planning/Control/Management, Network Tomography, Cross-Layer Control, Green/Energy Saving Technology, Fairness, Reliability/Safety

Assessment, Measurement, and Control of Wireless Communication Quality


B-12. Photonic Network

[Photonic network device]

fundamental device technology, new material/new phenomena, packaging/housing technology, photonic switching, photonic signal processing, photonic label processing, wavelength conversion, photonic memory

[Photonic network system]

photonic packet switching, photonic path/burst switching, optical multiplexing, optical interconnection, optical modulation/demodulation, photonic access technology, Ethernet technology, optical space communication

[Photonic network control and management]

photonic network operation and management, photonic network planning, traffic engineering, SDN (OpenFlow etc.)/NFV, routing, signaling, inter-domain routing, network monitoring

[Photonic network application]

low-delay high-speed application, huge contents transfer, high quality video transmission, grid computing, overlay network, transmission protocol for broadband communication application

[Photonic network architecture]

Beyond IP network, cross-layer interworking, photonic network test bed, inter operability test, optoelectronic technology, power reduction technology, high capacity Data-Center network, flexible (grid) network

B-13. Optical Fiber Technologies

[Optical fiber sensing]

Optical fiber probe, Optical fiber gyroscope, Optical fiber sensor device, Distributed optical sensing, Remote optical sensing, Optical fiber measurement, Optical reflectometry

[Optical fiber devices]

Optical signal/information processing, Optical fiber interferometer, Optical fiber amplifier, Optical fiber laser, Optical fiber coupler/splitter, Optical filter, Optical fiber device for various division multiplexing

[Optical fiber systems]

Image/Illumination/Display, Material processing system, Medical system, Biological system, High-power system, Environmental system, Communication system

[Optical fiber wiring/installing, maintenance/operations]

Testing system for optical line, Management for optical line, Reliability of optical line, Design of optical line, Construction technique for optical line, Optical connector/interconnection, Optical line components, Optical line/Optical connection for various division multiplexing

[Design of optical fiber/cable]

Characterization of optical fiber, Reliability of optical fiber, Optical propagation analysis, Analysis of optical fiber character, Optical fiber cable/Optical fiber cord, Optical fiber for various use, Optical fiber/cable for various division multiplexing

B-14. Technical Committee on Information Communication Management

[Element and Network Management]

Mobile and wireless networks, IP networks, Software-defined networks, Access networks, Terminal management, M2M and IoT, Home networks, SON

[Service and Business Management]

XaaS, Data service management, Hosting and collocation, Social network services, Cloud
B-15. Mobile Network and Applications

[Mobile Network Technologies]
Mobile Network Architecture, Mobility Support, Mobile Streaming, Mobile Multicast, Flow Control in Mobile Network, Mobile Application QoS, Vehicular Networking, Mobile Ubiquitous Network

[Mobile Terminal Technologies]
Terminal Architecture, Media Presentation, Home Networking using Mobile Terminal, Mobile Thin-Client

[Mobile Application Technologies]

[Mobile Service Technologies]

B-16. Internet Architecture

[Internet Case Studies and Social Implications]
Green IT, Educational Case Study, Medical Case Study, Support for the Aged and the Challenged, Business Continuity, Copyright Protection, Internet Broadcasting, Network Neutrality

[Internet Interconnection, Operation and Management]

[Network Architecture and Protocol]

[R&D Testbed Construction and Utilization, Sensor Application, Video Streaming]
Open Technology, Mashup, Rich Client, Cloud Computing

[Internet Security]
Security Policy and Information Ethics, Personal Information Protection, E-mail and Anti-SPAM, Traceback Technologies, VPN (Virtual Private Network), PKI (Public Key Infrastructure), IDS/IPS (Intrusion Detection/Protection System)

B-17. Smart Radio

[Software radio]
software radio architecture, wideband/multi-band antenna, reconfigurable RF circuit, high speed and high efficiency AD & DA converter, reconfigurable logic device, blind signal detection, adaptive communication, software download and security

[Cognitive radio]
spectrum sensing, global roaming, dynamic spectrum access, channel aggregation, media access control for cognitive radio, load balancing, cognitive network

[Wireless distributed network]
cooperative sensing, spectrum sharing, active and passive interference cancellation, distributed MIMO, adaptive resource allocation, cooperative communication, cross layer optimization, synchronization for distributed network

[Wireless transceiver implementation]
software radio transceiver, cognitive radio transceiver, implementation of wireless signal processing, prototype hardware, radio regulation approval test, interoperability test, middleware, application program interface
B-18. Ambient intelligence and Sensor Networks
[Ubiquitous Sensing and Actuation Technique]
Spatial Sensing, Vital Sensing, Mobile Sensing, Ambient Interface, Device/Appliance Technique, Embedded Software, Sensing and Control Theory
[Ad Hoc, Mesh, and Sensor Networks]
[Ambient Intelligence]
Sensor Database, Context Extraction, Mining, Location Information Technique, Stream Processing, Privacy and Security, Big Data, Learning and Signal Processing
[System Basement]
Wider Area System, Dependability, IoT, M2M and D2D, Cyber Physical, Operation Management, Autonomous Decentralized Control
[System Application]
Supporting System for Agriculture, Forestry, and Fisheries, Medical and Healthcare System, Disaster Prevention and Reduction System, Smart Space, Industry Supporting System, Social Infrastructure System, Wide Area Sensing System

B-19. Short Range Wireless Communications
[Propagation and Antenna]
indoor radio propagation, outdoor radio propagation, propagation in cars, portable (omnidirectional) antenna, beamforming, channel model, MIMO.
[Physical Layer]
modulation/demodulation, error correction technique, synchronization, equalization, OFDM, MIMO, RF TRX, interference cancellation, radar
[MAC]
CSMA/CA, MAC for high speed communication, MAC for wide-coverage sensor network, MAC for medical wireless system, interference avoidance, pico·net, ad·hoc, dynamic spectrum access
[Network / Security]
machine to machine (M2M) communication, TVWS, smart grid, multi-hop network, near field communication (NFC), wireless sensor network, wireless personal area network (PAN), positioning
[Implementation]
ASIC technology, millimeter wave RFCMOS, compound semiconductor RF, low noise RF receiver, low power consumption HW implementation techniques, low power consumption SW coding technique, small and feathery HW implementation technique

B-20. Healthcare and Medical Information Communication Technology
[PHY/MAC Technologies for Healthcare and Medical Applications]
medical communication, ranging and sensing in physical layer, medical access Control and Error-control, protocol in MAC layer, channel modeling, medical equipments and devices, Vital Sensors, medical actuators, wearable and implant sensors and devices
[Network Technologies for Healthcare and Medical Applications]
healthcare and medical network architecture, routing, topology, M2M, IoT, medical fault tolerancy
[Applications Related to Healthcare and Medical ICT]
healthcare and medical security (encryption, authentication), user interface, medical network management, software, vital signal processing, image processing, body area network (BAN), sensor network, infrastructure network, satellite network, energy network, wearable game and entertainment
[Design Technology for Ensuring Human Safety for Healthcare and Medical Applications]
EMC design, radio safety guideline, specific absorption ratio (SAR), medical antenna, transducer, devices, components, package, shield technologies
[Information Sharing and Protection of Personal Information]
medical information sharing, protection, strategy for global social services, standardization, instruction and guides for clinical staffs, safety guideline for medical devices, medical ethics, regulatory science for medical equipments and devices (radio regulation, clinical and pharmaceutical affairs, PL law)

B-21. Extremely advanced Optical Transmission
[Novel Transmission Optical Fibers]
Ultra-high-power Transmission Optical Fibers, Optical Fibers for Space Division Multiplexing, Optical Fibers for Mode Division Multiplexing, Multi-core Optical Fibers, Multi-mode Transmission Optical Fibers, Novel Splicing Technologies, Novel Optical Connectors
[Ultra-dense Multiplexing/Transmission Technologies]
Space Division Multiplexing/Mode Division Multiplexing Transmission, Novel Modulation Formats,
Signal Processing, MIMO Processing, Optical Amplifiers for Space Division Multiplexing
[Novel Optical Node Architecture]
Exa-class Node Architecture, Exa-class Switching Technologies, Exa-class Optical Node Control Technologies
[Ultra-high-capacity Optical Submarine Cable Systems]
Petabit-class Optical Submarine Transmission Technologies, Petabit Cable Technologies, Petabit Optical Amplifiers
C: Electronics Society

C-1. Electromagnetic Theory

C-2A. Microwave and Millimeter Wave Active Devices and Circuits
Devices and circuits and their fabrication technologies, design theories, simulation analyses and measurement techniques for oscillators, amplifiers, mixers, frequency multipliers, frequency dividers, detectors, phase shifters, switches, etc.

C-2B. Microwave and Millimeter Wave Passive Devices
Devices and their fabrication technologies, design theories, simulation analyses and measurement techniques for waveguides, circuit elements, resonators, filters, power combiners/dividers, directional couplers, multiplexers/demultiplexers, ferrite/nonreciprocal circuits, functional materials, etc.

C-2C. Microwave and Millimeter Wave Systems and Subsystems
Radar systems, communication systems, sensor and imaging systems, holographic systems, microwave heaters, medical applications, etc.

C-3. Optoelectronics
hotonic integrated circuit (dielectric), optical waveguide device (any material), modeling of optical waveguide, optical fiber (including multi-core, multimode, special fiber, and connection technology), optical module, optical interconnection, optical sensor, optical measurement, optical memory, optical information processing, optical signal processing, optical switch and modulator (dielectric), free space optical device (including MEMS), photonic crystal (passive), opto-electronic integrated circuit, hybrid integration, all optical processing, silicon photonics.

C-4. Lasers and Quantum Electronics
[Active photonic device (including device-oriented optical module)]
Semiconductor laser, light-emitting diode, optical amplifier (semiconductor, fiber amp.), fiber laser, optical switch and modulator (semiconductor), optical detector (semiconductor and etc.), optical integrated circuit (semiconductor), active photonic crystal, wavelength conversion, optical soliton, ultra-short optical pulse, THz equipment and device.
[Optical fundamental technology]
nonlinear optics, phase conjugate optics, quantum optics, laser spectroscopy, semiconductor epitaxial growth and process for optical device, optical material property.

C-5. Electromechanical Devices
Contact phenomena, Electrical discharge phenomena, Contact components and their materials, Spring and mechanical systems, and their materials, Electromechanical conversion systems, such as small motors and their materials, Electromechanical components and optical-electro-mechanical components, such as relays, switches and connectors and optical, Opto-mechatronics, Information input-output devices, Other electromechanical components, Mounting technology of electromechanical components and devices

C-6. Electronic Component Parts and Materials
Dielectric, piezoelectric, magnetic and organic materials; Conductors and semiconductors; Photonic materials and man-made photonic crystal; Other electronic materials and material science; Sophisticated methods for crystal growth and fabrication of thick or thin films; Sensors, recording devices, display devices and hybrid integrated circuit devices; Electrochemical materials and batteries; Packaging technology and design technology for electronic components; Evaluation and analytical technology for electronic components, and evaluation technology of reliability

C-7. Magnetic Recording
C-8. Superconducting Electronics
Superconducting integrated circuits (Single-flux-quantum digital circuits, Digital/analog mixed circuits, etc.), Superconducting sensing devices (SQUIDs, SSPDs, SIS mixers, STJs, MKIDs, TESs, etc.), Superconducting quantum metrology devices (Voltage standards, Current standards, etc.), Superconducting quantum computers, Superconducting passive devices (Filters, etc.), Superconducting device fabrication technology (Thin-film technology, Josephson-junction technology, etc.), Circuit design technology, Jisso and system technology (High-frequency mounting technology, Cryogenic-temperature mounting technology, Cooling technology, etc.), Superconducting device applications (Information processing, Communications, Measurement and analysis, Medical and biological systems, etc.)

C-9. Electronic Displays
Emissive displays, Non-emissive displays, Printers, Display devices and systems, Driving elements, circuits and systems, Human engineering for displays, Display materials, parts, manufacturing technology.

C-10. Electron Devices
[Electron devices and integrated circuits]
Optical communication, Mobile communication, Microwave, Millimeter wave, Ultra-high speed digital, Imaging sensor, Display, High-power device
[Device type]
FET, HEMT, HBT, Bipolar device, Diode, Power device (IGBT, Thyristors, etc.), TFT, MOS・MIS・Schottky devices, Solar cells, Sensors, Quantum effect devices, Single-electron devices, CNT devices, Vacuum nanodevices, Electron tubes, MEMS, Filters, Other novel devices
[Materials]
Compound semiconductors (II-V, III-IV etc.), SiGe, SiC, Diamond, Carbon, Amorphous semiconductors, Poly-type semiconductors, Oxide semiconductors, ferroelectrics and paraelectrics, Superconductors, Organic materials, Other electric materials
[Process technology]
Crystal growth, Heterojunctions, Nanostructures, Control of surfaces and interfaces, Electrodes, Passivation, Beam application
[Modeling and simulation]
Device/process, Thermal, Stress, Circuit, etc.
[Phenomena in electron devices]
Carrier transport, Distortion, Noise, Nonlinear phenomena, Chaos etc.

C-11. Silicon Device and Materials
(Material ・Process Technology ・Reliability)
silicon devices, LSI production materials (single crystal silicon, poly crystal silicon, amorphous silicon, epitaxy, crystal defects, impurities, wafer process, refractory metals, metallic silicides, resist, dielectrics, packaging materials, super clean water, high purity gas, high purity chemicals), and these characterization, device ・ process technologies, tool technologies,high density and large scale integration technologies(lithographies, fine patterning, surface treatments, process clean, etching, spatter, CVD,impurity diffusion, ion implantation, device isolation, planarization, multi-level wiring, SOI, selective growth), production yield and reliability problems(hot carrier effect, electromigration, stressmigration, radiation-resist, defect check, passivation)
(Device Structure ・Characterization)
bipolar transistor, FET, MOS, CMOS, BiCMOS, SIT, TFT, dynamic memory cell, Nonvolatile memory cell, high speed devices, large scale integrated devices, Low temperature operated devices, analogue devices, radiation-resistant devices, Power devices, 3-dimensional devices, SOI devices, Si-hetero devices, various sensors, solar cell, wafer scale device, Si quantum effect devices.
(Simulation ・Modeling)
process ・ device simulation, process ・ device modeling, particle model simulation, Integrated simulation system.

C-12. Integrated Circuit and Devices
[Memory Integrated Circuits, Memory]
Memories (DRAM, SRAM, Flash Memory), Functional Memories (CAM, Intelligent Memories), Special Purpose Memories (Video Memories, Switch Fabric, FIFO).
[Analog Integrated Circuits, Analog]
A/D Converters, D/A Converters, Operational Amplifiers, Comparators, Filters, CCD, Analog Neural Networks, Mixed Signal LSI, LSI Sensors.
C-13. Organic Molecular Electronics

C-14. Technical Committee on Microwave Photonics
Microwave, millimeter-wave, sub-millimeter wave optical devices and driving circuits: Generation and control of microwave and millimeter-wave and ultrafast electrical signals based on optical techniques: Generation of optical LO: Optical spectral synthesis: Hybrid photonic and microwave devices and subsystems: Transmission of microwave and millimeter-wave using optical fiber (ROF: Radio on fiber): Fiber-driven wireless access systems: Optically controlled antenna and phased arrays: Optical wireless applications: Measurement of microwave and millimeter-wave using optical means: Application of microwave photonics for free space and astronomy: Terahertz wave and applications: Bandgap structures for optical wave and microwave and their applications: MEMS technology for microwave photonics

C-15. Electronics Simulation Technology
Techniques on computer simulations for electronic engineering (electromagnetic theory, circuits, semiconductors, electronic systems, etc.), Acceleration techniques on computer simulations, Comparison and estimation of simulators (standard problems for the comparison/estimation), Global modeling, Multi-physics simulation, Standard computer platforms for simulators, Simulators for educational purposes (electromagnetic theory and so on).
D: Information and Systems Society

D-1. Theory of Computation

D-2. Neuro Computing
computational theory of neuroscience, neural network model, modeling of perception, cognition, behavior, and thought modeling of memory, learning and inference, modeling of motion control, internal representation of neural information, neuro-computing architecture and related devices, parallel distributed processing model of the neural system, computational neuroscience, cognitive science, visual and auditory psychophysics, visually-guided robot with audio equipment

D-3. Software Science

D-4. Data Engineering

D-5. Natural Language Understanding and Models of Communication
Fundamental natural language processing techniques (parsing, lexical acquisition, machine learning), Text Mining (opinion mining, exploiting collective intelligence, medical information analysis), Application (usage of analytics tools for real business, voice of customer analysis)

D-6A. Computer Systems A (Architecture)

D-6B. Computer Systems B (Hardware)
Power Unit, Storage, Input/Output Device, Non-volatile Memory, Diagnostics and Maintenance, Operation Technique, Test Program

D-6C. Computer Systems C (Software)
Virtual Machine Monitor, Operating System, Compiler, Interpreter, Binary Translation, Middleware, Firmware, Library, Database Management System, Application Program, Accelerator Application, Annotation, Low Power Software

D-7A. Medical Engineering and Biocybernetics A (Biocybernetics)
Molecular bioengineering, Hormonal and Immune systems, Cell fusion and Biotechnology, Biocomputer, Measurement and Application for Cellular system function, Novel measuring method for Brain and Neural systems, Neural and Physiological systems Analysis, Information processing in Brain and Sensory system, Psychological/Physiological Engineering analysis on Sensory system, Physiological engineering of Memory, Learning, and Self-organization, Psychophysical measurement and analysis, Model and Simulation in Biological system, Fluctuation and Rhythm in Biological system, Analysis on Movement and Control in Biological system, Biomechanics

D-7B. Medical Engineering and Biocybernetics B (Medical Engineering)
Medical monitoring for human, Clinical Biosignal processing, Medical engineering for Ophthalmology,
Dentistry and Obstetrics, Medical sensor, transducer and telemeter, Biomagnetics, Electromagnetic environment, and Hyperthermia, Medical Ultrasonic engineering, Medical optics, Artificial organ, Biofunction substitution, and Prosthetic engineering, Biocontrol, Biofeedback, Rehabilitation engineering, Medical image processing and measuring, Development and Analysis of Medical instrument system, Medical diagnosis and expert system, Medical informatics, Human, behavioral and psychological Engineering, Space medicine, Medical safety and Clinical Engineering

D-8. Artificial Intelligence and Knowledge Engineering

Intelligent Communication, Intelligent Agent, Agent Communication, Intelligent Groupware, Intelligent Interface, Knowledge Media, Intelligent CAI, Artificial Life/Intelligent Robot, Cooperative Problem Solving, Knowledge Sharing and Reuse, Knowledge Engineering and Expert System, Knowledge Representation and Inference, Knowledge Acquisition and Learning, Distributed / Parallel Artificial Intelligence, Genetic Algorithm, AI Applications

D-9. Life Intelligence and Office Information System


D-10. Dependable Computing

dependable computing (dependable system, dependable computing system, dependable computer, dependable network, dependable software, dependable hardware, etc.), fault-tolerant system, (parallel / distributed / cooperative system, operating system, database system, real-time system, assurance system, computer network, system design methodology / tool, etc.), fault-tolerant software (programming, data structure, interprocess communication and synchronization, transaction processing, exception handling, system reconfiguration, error recovery, etc.), fault-tolerant hardware (fault prevention, fault masking, fault detection / diagnosis / reconfiguration, functional recovery, failsafe, error detection / correction code, defect avoidance design, VLSI related, etc.), design / verification / testing (test generation, design for testability, test synthesis, self testing, fault diagnosis, fault verification, program verification / testing, protocol verification / testing, logic / fault simulation, etc.), reliability / safety / performance evaluation (system reliability, system safety, analysis model, simulation, measurement / evaluation method, performance evaluation tool, etc.), maintenance and diagnosis, remote diagnosis, fault-tolerance application technology (process control, robotics, neural network, fuzzy system, factory automation, office automation, medical system, etc.)

D-11A. Image Engineering

(Basic image technology, Image coding, Image representation, quality assessment) Image information theory, Image/video coding, Source coding, Quantization, UHDTV, Superresolution, High dynamic range/high frame rate video, Multi-view video/free viewpoint video, Holography, Computational photography, Human visual system, Image quality assessment, Color engineering, Multi-spectral image, Graph signal processing, Image restoration, Image features.

D-11B. Image Engineering


D-12A. Pattern recognition and media understanding A(recognition, understanding, and synthesis of pattern media)

recognition, understanding, and synthesis of documents, characters, graphics, drawings, maps, multimedia; digital library; media conversion; human vision; perception model; cognitive model;
pattern generative model; recognition and understanding theory; understanding model; learning theory; feature extraction; discrimination theory; image segmentation; pattern analysis; pattern representation; pattern matching; learning mechanism; self-organization system; neural network; embedded hardware; software library; pattern database; pattern dictionary; intelligent pattern media.

D-12B. pattern recognition and media understanding A(recognition, understanding, and synthesis of pattern media)

image and video recognition, understanding and synthesis; 3-D reconstruction; sensor fusion; regularization; active vision; motion analysis; robot vision; object recognition and environment understanding; virtual environment synthesis; application of computer vision to virtual reality; intelligent graphics; animation; multimodal interface; embedded hardware; software library; intelligent robot.

D-13. Knowledge Based Software Engineering


D-14. Speech and auditory processing

theory of speech processing, speech production, speech perception, speech quality assessment, speech analysis, feature extraction of speech, synthesis of phonological unit and prosody, text to speech (TTS), speech recognition, speech understanding, spoken dialog modelingspoken language processing, knowledge processing for spoken language, singing information processing, compression of speech signal, high density speech recording, signal processing for speech, speech technology for welfare, language education, speech input and output device, human auditory system, auditory function, auditory model, auditory information processing.

D-15. Educational Technology

educational information, CAI, ITS, CMI, knowledge information processing and education, database technology and education, simulation technology and education, network for educational information, electronics, information and communication technology and education, educational equipment · media, distance education, multimedia environment, information-processing education, computer literacy, educational evaluation, curriculum development, educational environment, technology transfer, human factor, human function measurement, audio-visual education technology, human interface in education, presentation technique, education of physically and mentally handicapped children, inhouse education

D-16. Medical Imaging

Image Science and Image Information Theory pertinent to Bio-Medical Imaging, Bio-Medical Imaging Instrumentation (CT, MRI, US, RI, Functional Imaging, Dynamic Imaging, etc.) and It's basic techniques such as Signal Detection/Mesurement/Processing, Bio-Medical Image Display, Man-Machine Interface for Diagnostic Imaging or Image Guided Therapy, Virtual or Mixed Reality for Medical Application, Pattern Recognition and Understanding of Medical Images, Medical Image Compression/Transmission/Archiving/Searching(Theory, System, Basic Technique, etc.), Computer Aided Diagnosis of Medical Images, Image Guided Surgery, Surgical/Treatment Planning, Virtualized Endoscopy System, Navigation-based Diagnosis, Medical Image Systems (PACS, Tele-medicine, RIS, HIS, 3D-Atlas, Education, etc.), Medical Image and Somatics

D-17. Software Interprise Modeling


D-18. Reconfigurable Systems

D-19. Information and Communication System Security

D-20. Information Based Induction Sciences and Machine Learning
Learning Theory (information theoretic/computational/statistical/statistical physical learning theory), Machine Learning Methodologies (supervised/unsupervised/semi-supervised learning, PAC learning, on-line learning, Bayes learning, model selection, kernel methods, boosting, distributed cooperative learning, agent learning, singularities, optimization, regularization, active learning, stochastic complexity, game-theoretic learning, computational statistics, Markov chain Monte Carlo, variational Bayes, anealing), etc.

Machine Learning Applications (signal processing, pattern recognition, bioinformatics, medical science, language/image/speech processing, financial engineering, robotics, brain information processing, neural systems, system biology etc.).

Data Mining (Graph mining, web mining, text mining, stream mining, network mining, sensor mining, privacy-preserving mining, large-scale computation, anomaly detection, business data analysis, etc.)

D-21. Enriched Multimedia
Protecting Values of Digital Content (media security, content security, digital rights management, integrity verification, digital forensics, privacy enhancing technologies, content delivery network, access control, secure communication, anonymous communication, secret sharing, obfuscation, digital watermarking, digital fingerprint, steganography, steganalysis), Enhancing Values of Digital Content (content integration, media fusion technologies, cross-media search, multimedia archive system, content processing, media recovery, multimedia annotation, automatic multimedia summarization), Creating Values of Digital Content (content design, reality creation, universal media, digital entertainment), Measuring Values of Digital Content (content evaluation, image and sound quality evaluation, metrics for perception and cognition, human auditory and visual system).

D-22. Cloud Network Robotics
[Networked Robot Cooperation and Collaboration]
Heterogeneous networks cooperation, sensor network, robotic service cooperation, tele-operation, tele-presence, robot safety assurance, semantic network, cloud sourcing

[Human-Robot Interaction]
Human-robot communication (verbal/non-verbal), media recognition and understanding, natural language understanding, multi-modal interface, situation recognition/classification, behavior recognition/classification, communication behavior generation, cognitive science, brain/Neuro science, social behavior model, knowledge processing, ontology

[Cloud Data Integration for Networked Robot (NR)]
Cloud service security, personal information utilization, robot ethics, legal restriction, ambient intelligence, geometric information for NR, user property and personal information management, cloud data mining, bigdata analytics, machine learning, inference/prediction, visualization, simulation, standardization

D-23. Services Computing
[Service]
Smart Service, CPS, smart application, Web API/API Economy, SOA, service composition, SLA, BPM, micro service, crowdsourcing, mobile service, business model/service economics
[Cloud]
SaaS, PaaS, IaaS, service Deployment / operation / management, container, hybrid cloud, multi-cloud, cloud native, development methodology (cloud first)

[BigData]
Big data analysis platform, big data analysis service, linked data service, ontology / semantic web, open data

[IoT]
IoT architecture, IoT platform, smart device, smart electrical appliance, edge computing, fog computing