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# 2021 IEEE Taxonomy

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**Created by  
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and  
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## IEEE Taxonomy: A Subset Hierarchical Display of IEEE Thesaurus Terms

The IEEE Taxonomy comprises the first three hierarchical 'levels' under each term-family (or branch) that is formed from the top-most terms of the IEEE Thesaurus. In this document these term-families are arranged alphabetically and denoted by **boldface** type. Each term family's hierarchy goes to no more than three sublevels, denoted by indents (in groups of four dots) preceding the next level terms. A term can appear in more than one hierarchical branch and can appear more than once in any particular hierarchy. The IEEE Taxonomy is defined in this way so that it is always a subset of the 2021 IEEE Thesaurus.

### **Aerospace and electronic systems**

.....Guns	.....Guns
.....Missiles	.....Missiles
.....Nuclear weapons	.....Nuclear weapons
.....Projectiles	.....Projectiles
....Radar	....Radar
.....Airborne radar	.....Airborne radar
.....Bistatic radar	.....Bistatic radar
.....Cognitive radar	.....Cognitive radar
.....Doppler radar	.....Doppler radar
.....Ground penetrating radar	.....Ground penetrating radar
.....High frequency radar	.....High frequency radar
.....Laser radar	.....Laser radar
.....Meteorological radar	.....Meteorological radar
.....Millimeter wave radar	.....Millimeter wave radar
.....Multistatic radar	.....Multistatic radar
.....MIMO radar	.....MIMO radar
.....Passive radar	.....Passive radar
.....Quantum radar	.....Quantum radar
.....Radar applications	.....Radar applications
.....Radar countermeasures	.....Radar countermeasures
.....Radar detection	.....Radar detection
.....Radar imaging	.....Radar imaging
.....Radar measurements	.....Radar measurements
.....Radar polarimetry	.....Radar polarimetry
.....Radar remote sensing	.....Radar remote sensing
.....Radar tracking	.....Radar tracking
.....Radar clutter	.....Radar clutter
.....Radar cross-sections	.....Radar cross-sections
.....Radar equipment	.....Radar equipment
.....Radar theory	.....Radar theory
.....Spaceborne radar	.....Spaceborne radar
.....Spread spectrum radar	.....Spread spectrum radar
.....Synthetic aperture radar	.....Synthetic aperture radar
.....Inverse synthetic aperture radar	.....Inverse synthetic aperture radar
.....Polarimetric synthetic aperture radar	.....Polarimetric synthetic aperture radar
.....Ultra wideband radar	.....Ultra wideband radar
....Sensor systems	....Sensor systems
.....Activity recognition	.....Activity recognition
.....Gunshot detection systems	.....Gunshot detection systems
....Aerospace control	
.....Air traffic control	
.....Attitude control	
.....Ground support	
....Aerospace engineering	
.....Aerospace biophysics	
.....Aerospace electronics	
.....Aerospace safety	
.....Air safety	
.....Aerospace simulation	
.....Aerospace testing	
.....Wind tunnels	
.....Artificial satellites	
.....Earth Observing System	
.....Low earth orbit satellites	
.....Military satellites	
.....Space stations	
.....Space technology	
.....Payloads	
.....Space debris	
.....Space exploration	
....Aerospace materials	
.....Aerospace components	
....Aircraft manufacture	
....Aircraft navigation	
....Aircraft propulsion	
.....Propellers	
....Command and control systems	
....Electronic warfare	
.....Electronic countermeasures	
.....Jamming	
.....Radar countermeasures	
....Military equipment	
.....Military aircraft	
.....Payloads	
.....Military satellites	
.....Military vehicles	
.....Weapons	



- ....Sonar
  - .....Sonar applications
    - .....Sonar detection
    - .....Sonar measurements
    - .....Sonar equipment
    - .....Synthetic aperture sonar
- ....Telemetry
  - .....Biomedical telemetry

### Antennas and propagation

- ....Antennas
  - .....Antenna accessories
    - .....Radomes
  - .....Antenna arrays
    - .....Adaptive arrays
    - .....Butler matrices
    - .....Linear antenna arrays
    - .....Log periodic antennas
    - .....Microstrip antenna arrays
    - .....Microwave antenna arrays
    - .....Phased arrays
    - .....Planar arrays
  - .....Antenna radiation patterns
    - .....Near-field radiation pattern
  - .....Antenna theory
    - .....Frequency selective surfaces
  - .....Apertures
    - .....Aperture antennas
    - .....Aperture coupled antennas
  - .....Broadband antennas
    - .....Ultra wideband antennas
    - .....Vivaldi antennas
  - .....Dielectric resonator antennas
  - .....Dipole antennas
  - .....Directional antennas
  - .....Directive antennas
  - .....Feeds
    - .....Antenna feeds
  - .....Fractal antennas
  - .....Helical antennas
  - .....Horn antennas
  - .....Leaky wave antennas
  - .....Loaded antennas
  - .....Log-periodic dipole antennas
  - .....Microstrip antennas
  - .....Microwave antennas
  - .....Mobile antennas
  - .....Multifrequency antennas
  - .....Omnidirectional antennas
  - .....Patch antennas

- .....Radar antennas
- .....Receiving antennas
- .....Rectennas
- .....Reflector antennas
- .....Satellite antennas
- .....Slot antennas
- .....Steerable antennas
- .....Transmission line antennas
- .....Transmitting antennas
- .....UHF antennas
- .....Yagi-Uda antennas
- ....Electromagnetic propagation
  - .....Electromagnetic diffraction
    - .....Optical diffraction
    - .....Physical theory of diffraction
    - .....X-ray diffraction
  - .....Electromagnetic propagation in absorbing media
  - .....Electromagnetic reflection
    - .....Optical reflection
  - .....Microwave propagation
  - .....Millimeter wave propagation
  - .....Optical propagation
    - .....Optical surface waves
    - .....Optical waveguides
  - .....Propagation constant
  - .....Propagation losses
  - .....Radio propagation
  - .....Radiowave propagation
  - .....Submillimeter wave propagation
  - .....UHF propagation
- ....Radio astronomy

### Broadcast technology

- ....Broadcasting
  - .....Digital audio broadcasting
    - .....Digital audio players
    - .....Digital Radio Mondiale
  - .....Digital multimedia broadcasting
  - .....Digital video broadcasting
  - .....Motion pictures
  - .....Radio broadcasting
    - .....Frequency modulation
  - .....Radio networks
  - .....Satellite broadcasting
  - .....Web TV



**Circuits and systems**

....Circuits	.....Neurofeedback
.....Active circuits	.....Hybrid integrated circuits
.....Active inductors	.....Integrated circuits
.....Gyrators	.....Analog integrated circuits
.....Operational amplifiers	.....Analog-digital integrated circuits
.....Adders	.....Application specific integrated circuits
.....Analog circuits	.....CMOS integrated circuits
.....Analog integrated circuits	.....Coproductors
.....Analog processing circuits	.....Current-mode circuits
.....Application specific integrated circuits	.....Digital integrated circuits
.....System-on-chip	.....FET integrated circuits
.....Asynchronous circuits	.....Field programmable gate arrays
.....Bipolar transistor circuits	.....Hybrid integrated circuits
.....BiCMOS integrated circuits	.....Integrated circuit interconnections
.....Bipolar integrated circuits	.....Integrated circuit modeling
.....Bistable circuits	.....Integrated circuit noise
.....Latches	.....Integrated circuit synthesis
.....Bridge circuits	.....Large scale integration
.....Charge pumps	.....MESFET integrated circuits
.....Circuit analysis	.....Microprocessors
.....Circuit analysis computing	.....Microwave integrated circuits
.....Coupled mode analysis	.....Millimeter wave integrated circuits
.....Nonlinear network analysis	.....Monolithic integrated circuits
.....Circuit faults	.....Photonic integrated circuits
.....Electrical fault detection	.....Power integrated circuits
.....Circuit noise	.....Radiofrequency integrated circuits
.....Thermal noise	.....Submillimeter wave integrated circuits
.....Circuit simulation	.....Superconducting integrated circuits
.....Circuit synthesis	.....Thick film circuits
.....High level synthesis	.....Thin film circuits
.....Integrated circuit synthesis	.....Three-dimensional integrated circuits
.....Coproductors	.....Through-silicon vias
.....Counting circuits	.....UHF integrated circuits
.....Coupling circuits	.....Ultra large scale integration
.....Digital circuits	.....Very high speed integrated circuits
.....Circuit topology	.....Very large scale integration
.....Digital integrated circuits	.....Wafer scale integration
.....Digital signal processors	.....Isolators
.....Distributed parameter circuits	.....Large scale integration
.....Driver circuits	.....Ultra large scale integration
.....Electronic circuits	.....Very large scale integration
.....Breadboard	.....Wafer scale integration
.....Central Processing Unit	.....Linear circuits
.....Multivibrators	.....Logic arrays
.....Stripboard circuit	.....Programmable logic arrays
.....Equivalent circuits	.....Logic circuits
.....Feedback	.....Combinational circuits
.....Feedback circuits	.....Logic arrays
.....Negative feedback	



.....Programmable logic arrays	.....Sequential circuits
.....Superconducting logic circuits	.....Silicon-on-insulator
.....Magnetic circuits	.....Silicon on sapphire
.....Microprocessors	.....Submillimeter wave circuits
.....Automatic logic units	.....Submillimeter wave integrated circuits
.....Biomimetics	.....Summing circuits
.....Coproductors	.....Switched circuits
.....Microcontrollers	.....Switched capacitor circuits
.....Microprocessor chips	.....Switching circuits
.....Vector processors	.....Choppers (circuits)
.....Microwave circuits	.....Logic circuits
.....Millimeter wave circuits	.....Switching converters
.....Millimeter wave integrated circuits	.....Zero current switching
.....Millimeter wave integrated circuits	.....Zero voltage switching
.....MIMICs	.....Thick film circuits
.....Monolithic integrated circuits	.....Thin film circuits
.....MIMICs	.....Thyristor circuits
.....MMICs	.....Time varying circuits
.....MOSFET circuits	.....Trigger circuits
.....CMOSFET circuits	.....UHF circuits
.....MOS integrated circuits	.....UHF integrated circuits
.....Power MOSFET	.....UHF integrated circuits
.....Multiplying circuits	.....Ultra large scale integration
.....Neural circuits	.....Very large scale integration
.....Nonlinear circuits	.....Neuromorphics
.....Nonlinear network analysis	.....Wafer scale integration
.....Passive circuits	.....VHF circuits
.....Phase shifters	.....Voltage multipliers
.....Phase transformers	.....Capacitors
.....Power dissipation	.....Diodes
.....Power integrated circuits	.....Wafer scale integration
.....Printed circuits	.....Contacts
.....Flexible printed circuits	.....Brushes
.....Memory modules	.....Contact resistance
.....Programmable circuits	.....Ohmic contacts
.....Field programmable analog arrays	.....Filtering
.....Programmable logic arrays	.....Filters
.....Programmable logic devices	.....Active filters
.....Programmable logic arrays	.....Anisotropic
.....Programmable logic devices	.....Bragg gratings
.....Pulse circuits	.....Channel bank filters
.....Flip-flops	.....Comb filters
.....Quantum circuit	.....Digital filters
.....Radiation detector circuits	.....Equalizers
.....Rail to rail operation	.....Filtering theory
.....Rail to rail amplifiers	.....Gabor filters
.....Rail to rail inputs	.....Harmonic filters
.....Rail to rail outputs	.....IIR filters
.....Rectifiers	.....Kalman filters
.....RLC circuits	.....Low-pass filters
.....Sampled data circuits	



.....Matched filters	.....Ham radios
.....Microstrip filters	.....Land mobile radio equipment
.....Nonlinear filters	.....Radio transceivers
.....Notch filters	.....Transponders
.....Particle filters	.....Receivers
.....Power filters	.....Optical receivers
.....Resonator filters	.....RAKE receivers
.....Spatial filters	.....Receiving antennas
.....Superconducting filters	.....Repeaters
.....Transversal filters	.....Speech codecs
.....Information filtering	.....Telephone equipment
.....Information filters	.....Cellular phones
.....Recommender systems	.....Landline
....Integrated circuit technology	.....Telephone sets
.....Beyond CMOS	.....Vocoders
.....CMOS technology	.....Transceivers
.....CMOS process	.....Radio transceivers
.....Silicon on sapphire	.....Transmitters
.....Moore's Law	.....Auxiliary transmitters
....Logic devices	.....Diversity methods
.....Logic gates	.....Neurotransmitters
.....Programmable logic devices	.....Optical transmitters
....Oscillators	.....Radio transmitters
.....Digital-controlled oscillators	.....Transmitting antennas
.....Injection-locked oscillators	.....Transponders
.....Local oscillators	.....TV equipment
.....Microwave oscillators	.....Large screen displays
.....Phase noise	.....TV receivers
.....Ring oscillators	.....Video codecs
.....Voltage-controlled oscillators	.....Video equipment
....Single electron devices	.....Optical projectors
.....Single electron memory	.....Video codecs
.....Hetero-nanocrystal memory	.....Videos
.....Single electron transistors	.....Vocoders
....Tunable circuits and devices	....Communication switching
.....RLC circuits	.....Code division multiplexing
.....Tuned circuits	.....Electronic switching systems
<b>Communications technology</b>	.....Frame relay
....Communication equipment	.....Handover
.....Auditory displays	.....Multiprotocol label switching
.....Codecs	.....Packet switching
.....Speech codecs	.....Burst switching
.....Video codecs	.....Frame relay
.....Modems	.....Multiprotocol label switching
.....On board unit	.....Packet loss
.....Optical communication equipment	....Communication systems
.....Optical transmitters	.....ARPANET
.....Radio communication equipment	.....Biomedical communication
.....Base stations	.....Biomedical telemetry
	.....Telemedicine
	.....Broadband communication



.....B-ISDN	.....Wireless access points
.....Broadband amplifiers	.....Cross layer design
.....Communication networks	.....Data buses
.....Central office	.....Backplanes
.....Cyberspace	.....Data communication
.....Industrial communication	.....Asynchronous communication
.....Maritime communications	.....Asynchronous transfer mode
.....Radio access technologies	.....Data buses
.....Relay networks	.....Data transfer
(telecommunication)	.....Telecommunication buffers
.....Communication system control	.....Telemetry
.....Telecommunication control	.....Teleprinting
.....Communication system security	.....Visible light communication
.....Denial-of-service attack	.....Device-to-device communication
.....Impersonation attacks	.....Digital communication
.....Quantum key distribution	.....Baseband
.....Radio communication	.....DICOM
countermeasures	.....Digital audio broadcasting
.....Communication system signaling	.....Digital images
.....Received signal strength indicator	.....Digital multimedia broadcasting
.....Communication system software	.....Digital video broadcasting
.....Streaming media	.....DSL
.....Communication system traffic	.....ISDN
.....Communication system traffic control	.....Passband
.....Computer networks	.....Portable media players
.....Ad hoc networks	.....SONET
.....Computer network management	.....Spread spectrum communication
.....Content distribution networks	.....Facsimile
.....Cyberspace	.....FDDI
.....Diffserv networks	.....Indoor communication
.....Domain Name System	.....Indoor environment
.....Ethernet	.....Internet
.....Heterogeneous networks	.....Bot (Internet)
.....Internet	.....Botnet
.....Intserv networks	.....Cloud computing
.....IP networks	.....Crowdsourcing
.....Metropolitan area networks	.....Instant messaging
.....Multiprocessor interconnection	.....Internet of Things
networks	.....Internet security
.....Network function virtualization	.....Internet telephony
.....Network security	.....Internet topology
.....Network servers	.....Linked data
.....Next generation networking	.....Middleboxes
.....Overlay networks	.....Semantic Web
.....Peer-to-peer computing	.....Social computing
.....Software defined networking	.....Web 2.0
.....Storage area networks	.....Web services
.....Token networks	.....IP networks
.....Unicast	.....TCPIP
.....Virtual private networks	.....ISDN
.....Wide area networks	.....B-ISDN



- .....Local area networks
- .....Wireless LAN
- .....Low latency communication
- .....Ultra reliable low latency communication
- .....Machine-to-machine communications
- .....Massive machine type communications
- .....Magnetic communication
- .....Metropolitan area networks
- .....Microwave communication
- .....Rectennas
- .....Military communication
- .....Reconnaissance
- .....MIMO communication
- .....Massive MIMO
- .....Rician channels
- .....MISO communication
- .....Mobile communication
- .....3G mobile communication
- .....4G mobile communication
- .....5G mobile communication
- .....6G mobile communication
- .....Ambient networks
- .....Cellular technology
- .....Dual band
- .....Land mobile radio
- .....Location awareness
- .....Mobile learning
- .....Mobile nodes
- .....Mobile security
- .....Mobile video
- .....Software radio
- .....Ultra-dense networks
- .....Molecular communication (telecommunication)
- .....Multiaccess communication
- .....Access charges
- .....Direct-sequence code-division multiple access
- .....Frequency division multiaccess
- .....Multicarrier code division multiple access
- .....Subscriber loops
- .....Time division multiple access
- .....Time division synchronous code division multiple access
- .....Zero correlation zone
- .....Multicast communication
- .....Multicast VPN
- .....Multimedia communication
- .....Hypermedia
- .....Nanocommunication (telecommunication)
- .....Narrowband
- .....NOMA
- .....Optical fiber communication
- .....FDDI
- .....Free-space optical communication
- .....Optical buffering
- .....Optical fiber networks
- .....Optical fiber subscriber loops
- .....Optical interconnections
- .....Optical packet switching
- .....Optical wavelength conversion
- .....Scheduling algorithms
- .....SONET
- .....Visible light communication
- .....Personal communication networks
- .....Protocols
- .....Access protocols
- .....Asynchronous transfer mode
- .....Consensus protocol
- .....Cryptographic protocols
- .....Master-slave
- .....Multicast protocols
- .....Multiprotocol label switching
- .....Proof of Work
- .....Routing protocols
- .....Smart contracts
- .....Transport protocols
- .....Wireless application protocol
- .....Zero knowledge proof
- .....Quality of experience
- .....Quality of service
- .....Admission control
- .....Quantum communication
- .....Quantum circuit
- .....Quantum networks
- .....Radio communication
- .....Baseband
- .....Bluetooth
- .....Cellular technology
- .....Indoor radio communication
- .....Land mobile radio
- .....Millimeter wave communication
- .....Near field communication
- .....Packet radio networks
- .....Passband
- .....Personal area networks
- .....Radio broadcasting





- .....Radio communication countermeasures
- .....Radio frequency
- .....Radio links
- .....Radio spectrum management
- .....Satellite communication
- .....Satellite ground stations
- .....Software radio
- .....Zigbee
- .....Regional area networks
- .....WRAN
- .....Routing
- .....Wavelength routing
- .....Satellite communication
- .....Downlink
- .....Satellite broadcasting
- .....Satellite ground stations
- .....Uplink
- .....Satellite ground stations
- .....SIMO communication
- .....SISO communication
- .....Spatial diversity
- .....Submillimeter wave communication
- .....Subscriber loops
- .....Switching systems
- .....Electronic switching systems
- .....Switching frequency
- .....Switching loss
- .....Telecommunication switching
- .....Synchronous digital hierarchy
- .....Telecommunications
- .....Ambient intelligence
- .....Feedback communications
- .....IP networks
- .....Radio access networks
- .....Railway communication
- .....Space communications
- .....Telecommunication computing
- .....Telecommunication network topology
- .....Telecommunication services
- .....Telematics
- .....Teleconferencing
- .....Telegraphy
- .....Telephony
- .....Teleprinting
- .....Teletext
- .....Token networks
- .....UHF communication
- .....Underwater communication
- .....Vehicle-to-everything
- .....Vehicle-to-infrastructure
- .....Videophone systems
- .....Videotex
- .....Visual communication
- .....Wide area networks
- .....Wideband
- .....Wireless communication
- .....Cognitive radio
- .....Cooperative communication
- .....Dedicated short range communication
- .....GSM
- .....Open wireless architecture
- .....Point-to-multipoint communications
- .....Roaming
- .....Smart devices
- .....Spatial diversity
- .....WiMAX
- .....Wireless access points
- .....Wireless application protocol
- .....Wireless networks
- .....WRAN
- .....Wireless mesh networks
- .....Wireless sensor networks
- .....Body sensor networks
- .....Event detection
- ...Couplers
- .....Directional couplers
- ...High-speed electronics
- .....High-speed integrated circuits
- .....High-speed networks
- .....Ultrafast electronics
- ...Image communication
- .....Facsimile
- .....Picture archiving and communication systems
- ...Information and communication technology
- .....Ambient assisted living
- ...Message systems
- .....Electronic mail
- .....Unified messaging
- .....Unsolicited e-mail
- .....Electronic messaging
- .....Instant messaging
- .....Unified messaging
- .....Postal services
- .....Publish subscribe systems
- .....Voice mail
- ...Modulation
- .....Amplitude modulation



- .....Amplitude shift keying
- .....Quadrature amplitude modulation
- .....Chirp modulation
- .....Demodulation
- .....Digital modulation
- .....Constellation diagram
- .....Partial response signaling
- .....Frequency modulation
- .....Frequency shift keying
- .....Magnetic modulators
- .....Modulation coding
- .....Interleaved codes
- .....Optical modulation
- .....Electrooptic modulators
- .....Intensity modulation
- .....Phase modulation
- .....Continuous phase modulation
- .....Differential phase shift keying
- .....Phase shift keying
- .....Pulse modulation
- .....Pulse width modulation
- .....Pulse width modulation inverters
- .....Space vector pulse width modulation
- ....Multiplexing
  - .....Code division multiplexing
  - .....Demultiplexing
  - .....Frequency division multiplexing
  - .....Layered division multiplexing
  - .....Multiplexing equipment
  - .....Add-drop multiplexers
  - .....OFDM
    - .....Multiple access interference
    - .....OFDM modulation
    - .....Partial transmit sequences
    - .....Peak to average power ratio
    - .....Space division multiplexing
    - .....Time division multiplexing
    - .....Wavelength division multiplexing
    - .....WDM networks
- ....Network topology
  - .....Complex networks
  - .....Computer network reliability
  - .....Network architecture
    - .....Active networking
    - .....Information-centric networking
    - .....Network function virtualization
    - .....Network slicing
  - .....Presence network agents
- ....TV
  - .....Analog TV
    - .....Cable TV
    - .....Must-carry
    - .....Color TV
    - .....Digital TV
    - .....HDTV
    - .....IPTV
    - .....Mobile TV
    - .....Smart TV
    - .....Three-dimensional television
    - .....Web TV
  - ....UHF technology
    - .....UHF antennas
    - .....UHF circuits
    - .....UHF integrated circuits
    - .....UHF communication
    - .....UHF devices
    - .....UHF integrated circuits
  - ....Ultra wideband technology
    - .....Ultra wideband antennas
    - .....Ultra wideband communication
    - .....Ultra wideband radar
  - ....VHF devices

### **Components, packaging, and manufacturing technology**

- ....Component architectures
- ....Electronic components
  - .....Capacitors
    - .....Power capacitors
    - .....Varactors
  - .....Coils
    - .....Superconducting coils
  - .....Connectors
    - .....Plugs
    - .....Sockets
  - .....Diodes
    - .....Diode lasers
  - .....Electrodes
    - .....Anodes
    - .....Cathodes
    - .....Microelectrodes
  - .....Fuses
  - .....Inductors
    - .....Active inductors
    - .....Thick film inductors
    - .....Thin film inductors
  - .....Resistors
    - .....Memristors
  - .....Switched capacitor networks
  - .....Varistors



- .....Structural plates
- .....Switches
  - .....Contactors
  - .....Microswitches
  - .....Optical switches
- .....Transducers
  - .....Acoustic transducers
  - .....Biomedical transducers
  - .....Capacitive transducers
  - .....Chemical transducers
  - .....Inductive transducers
  - .....Piezoelectric transducers
  - .....Resistive transducers
  - .....Ultrasonic transducer arrays
- ...Electronic equipment manufacture
  - .....Damascene integration
  - .....Micromachining
  - .....Radiation hardening (electronics)
  - .....Semiconductor device manufacture
    - .....Diffusion processes
    - .....Flip-chip devices
    - .....High-k gate dielectrics
    - .....Physical unclonable function
    - .....Quasi-doping
    - .....Semiconductor device doping
    - .....Semiconductor epitaxial layers
    - .....Semiconductor growth
    - .....Silicidation
    - .....Wafer bonding
- ...Electronics packaging
  - .....Chip scale packaging
  - ...Environmentally friendly manufacturing techniques
    - ....Integrated circuit manufacture
      - .....Surface-mount technology
    - ....Integrated circuit packaging
      - .....Multichip modules
      - .....Plastic integrated circuit packaging
      - .....Semiconductor device packaging
    - ....Thermal management of electronics
      - .....Electronic packaging thermal management
    - .....Electronics cooling
- Computational and artificial intelligence**
  - ...Artificial intelligence
    - .....Affective computing
    - .....AI accelerators
    - .....Autonomous robots
    - .....Bio-inspired computing
  - .....Cognitive systems
    - .....Context awareness
    - .....Cooperative systems
    - .....Decision support systems
    - .....Intelligent systems
      - .....Autonomous systems
      - .....Collective intelligence
      - .....Intelligent robots
    - .....Knowledge based systems
      - .....Expert systems
      - .....Mobile agents
    - .....Knowledge engineering
      - .....Inference mechanisms
      - .....Knowledge acquisition
      - .....Knowledge discovery
      - .....Knowledge representation
    - .....Learning (artificial intelligence)
      - .....Distance learning
      - .....Electronic learning
      - .....Naive Bayes methods
      - .....Nearest neighbor methods
    - .....Learning systems
      - .....Backpropagation
      - .....Cognitive systems
      - .....Hybrid learning
      - .....Learning automata
      - .....Learning management systems
      - .....Semisupervised learning
      - .....Supervised learning
      - .....Unsupervised learning
    - .....Machine learning
      - .....Adversarial machine learning
      - .....Boosting
      - .....Deep learning
      - .....Dimensionality reduction
      - .....Random forests
      - .....Reinforcement learning
      - .....Relevance vector machines
      - .....Robot learning
      - .....Statistical learning
    - .....Prediction methods
      - .....Linear predictive coding
      - .....Predictive coding
      - .....Predictive encoding
      - .....Predictive models
      - .....Virtual artifact
    - .....Autonomous mental development
  - ...Computational intelligence
    - .....Computation theory
      - .....Computational complexity
      - .....Concurrent computing



- .....Greedy algorithms
  - .....Support vector machines
  - .....Evolutionary computation
  - .....Evolutionary robotics
  - .....Particle swarm optimization
  - .....Fuzzy systems
  - .....Fuzzy control
  - .....Fuzzy neural networks
  - .....Hybrid intelligent systems
  - .....Genetic algorithms
  - ....Logic
  - .....Fuzzy logic
  - .....Takagi-Sugeno model
  - .....Multivalued logic
  - .....Probabilistic logic
  - .....Sufficient conditions
  - ....Machine intelligence
  - .....Pattern analysis
  - ....Neural networks
  - .....Artificial neural networks
  - .....Convolutional neural networks
  - .....Hebbian theory
  - .....Long short term memory
  - .....Residual neural networks
  - .....Self-organizing feature maps
  - .....Biological neural networks
  - .....Cellular neural networks
  - .....Feedforward neural networks
  - .....Extreme learning machines
  - .....Multilayer perceptrons
  - .....Graph neural networks
  - .....Multi-layer neural network
  - .....Neural network hardware
  - .....Radial basis function networks
  - .....Recurrent neural networks
  - .....Hopfield neural networks
- Computers and information processing**
- ....Approximate computing
  - ....Computer applications
  - .....Application virtualization
  - .....Edge computing
  - .....Big Data applications
  - .....Blockchain
  - .....Consensus protocol
  - .....Bot (Internet)
  - .....Computer aided analysis
  - .....Computer aided engineering
  - .....Computer aided instruction
  - .....Learning management systems
  - .....Computer generated music
  - .....Computer integrated manufacturing
  - .....Control engineering computing
  - .....Green computing
  - .....High energy physics instrumentation computing
  - .....Linear particle accelerator
  - .....Knowledge management
  - .....Knowledge transfer
  - .....Mathematics computing
  - .....Matlab
  - .....Medical information systems
  - .....Electronic medical records
  - .....Military computing
  - .....Mobile applications
  - .....Physics computing
  - .....Power engineering computing
  - .....Power system analysis computing
  - .....Publishing
  - .....Bibliometrics
  - .....Company reports
  - .....Desktop publishing
  - .....Electronic publishing
  - .....Journalism
  - .....Open Access
  - .....Scientific publishing
  - .....Scientific computing
  - .....Telecommunication computing
  - .....Internetworking
  - .....Soft switching
  - .....Virtual assistants
  - .....Virtual enterprises
  - .....Virtual manufacturing
  - .....Virtual machining
  - .....Web sites
  - .....Multimedia Web sites
  - .....MySpace
  - .....Uniform resource locators
  - .....Web design
  - .....World Wide Web
  - .....Bot (Internet)
  - .....Mashups
  - ....Computer architecture
  - .....Accelerator architectures
  - .....Data structures
  - .....Arrays
  - .....Binary decision diagrams
  - .....Null value
  - .....Octrees
  - .....Persistent identifiers
  - .....Table lookup



.....Tree data structures	.....Internet
.....Dynamic voltage scaling	.....Bot (Internet)
.....Memory architecture	.....Botnet
.....Memory management	.....Cloud computing
.....Multiprocessor interconnection	.....Crowdsourcing
.....Hypercubes	.....Instant messaging
.....Parallel architectures	.....Internet of Things
.....Multicore processing	.....Internet security
.....Reconfigurable architectures	.....Internet telephony
.....Reconfigurable intelligent surfaces	.....Internet topology
...Computer interfaces	.....Linked data
.....Application programming interfaces	.....Middleboxes
.....Restful API	.....Semantic Web
.....WebRTC	.....Social computing
.....Browsers	.....Web 2.0
.....Computer ports	.....Web services
.....Field buses	.....Intserv networks
.....Firewire	.....IP networks
.....Haptic interfaces	.....TCPIP
.....Data gloves	.....Metropolitan area networks
.....Force feedback	.....Multiprocessor interconnection networks
.....Grasping	.....Network function virtualization
.....Tactile Internet	.....Cloud radio access networks
.....Hypertext systems	.....Network security
.....Input devices	.....Network reconnaissance
.....Interface phenomena	.....Network servers
.....Network interfaces	.....Next generation networking
.....Interface states	.....Overlay networks
.....Musical instrument digital interfaces	.....Peer-to-peer computing
.....System buses	.....Software defined networking
...Computer networks	.....Service function chaining
.....Ad hoc networks	.....Storage area networks
.....AODV	.....Token networks
.....Mesh networks	.....Unicast
.....Mobile ad hoc networks	.....Virtual private networks
.....Vehicular ad hoc networks	.....Extranets
.....Computer network management	.....Wide area networks
.....Computer network reliability	.....Wireless access points
.....Disruption tolerant networking	...Computer performance
.....Management information base	.....Computer errors
.....Middleboxes	.....Computer crashes
.....Network address translation	.....Hardware acceleration
.....Network synthesis	.....Performance loss
.....Content distribution networks	...Computer peripherals
.....Cyberspace	.....Disk drives
.....Diffserv networks	.....Keyboards
.....Domain Name System	.....Modems
.....Ethernet	.....Printers
.....Energy efficient ethernet	.....Laser printers
.....EPON	...Computer science
.....Heterogeneous networks	



.....Computational neuroscience  
 .....Formal languages  
 .....Computer languages  
 .....Runtime library  
 .....Network theory (graphs)  
 .....Programming  
 .....Augmented reality  
 .....Automatic programming  
 .....Concatenated codes  
 .....Functional programming  
 .....Granular computing  
 .....Integer linear programming  
 .....Logic programming  
 .....Microprogramming  
 .....Object oriented methods  
 .....Object oriented programming  
 .....Opportunistic software systems  
 development  
 .....Parallel programming  
 .....Performance analysis  
 .....Programming profession  
 .....Robot programming  
 ....Computer security  
 .....Application security  
 .....Authentication  
 .....Multi-factor authentication  
 .....Cloud computing security  
 .....Computer crime  
 .....Counterfeiting  
 .....Cyber terrorism  
 .....Cyberattack  
 .....SQL injection  
 .....Computer hacking  
 .....Countermeasures (computer)  
 .....Cross-site scripting  
 .....Cyber espionage  
 .....Cyber warfare  
 .....Cyberattack  
 .....Data integrity  
 .....Denial-of-service attack  
 .....Distributed denial-of-service attack  
 .....Firewalls (computing)  
 .....Honey pot (computing)  
 .....Identity management systems  
 .....Internet security  
 .....Mobile security  
 .....Password  
 .....Penetration testing  
 .....Permission  
 .....Phishing  
 .....Proof of Work  
 .....Trusted computing  
 ....Computers  
 .....Analog computers  
 .....Calculators  
 .....Difference engines  
 .....Digital computers  
 .....Mainframes  
 .....Microcomputers  
 .....Portable computers  
 .....Workstations  
 .....Parallel machines  
 .....Supercomputers  
 .....Exascale computing  
 .....Tablet computers  
 .....Wearable computers  
 .....Smart glasses  
 ....Concurrency control  
 .....Processor scheduling  
 .....Scheduling algorithms  
 ....Data systems  
 .....Data acquisition  
 .....Fastbus  
 .....User-generated content  
 .....Data centers  
 .....Data center power  
 .....Data compression  
 .....Adaptive coding  
 .....Audio compression  
 .....Huffman coding  
 .....Source coding  
 .....Test data compression  
 .....Transform coding  
 .....Data conversion  
 .....Analog-digital conversion  
 .....Digital-analog conversion  
 .....Data engineering  
 .....Data handling  
 .....Data assimilation  
 .....Data dissemination  
 .....Data encapsulation  
 .....Data governance  
 .....Data integrity  
 .....Document handling  
 .....Merging  
 .....Open data  
 .....Sorting  
 .....Data processing  
 .....Associative processing  
 .....Business data processing  
 .....Data analysis  
 .....Data collection



- .....Data integration
- .....Data preprocessing
- .....Data transfer
- .....Information exchange
- .....Spreadsheet programs
- .....Text processing
- .....Virtual enterprises
- .....Data storage systems
- .....Triples (Data structure)
- .....Data warehouses
- ....Database machines
- ....Digital systems
- .....Digital preservation
- .....Digital storage
- .....Solid state drives
- .....Digital transformation
- .....Internet
- .....Bot (Internet)
- .....Botnet
- .....Cloud computing
- .....Crowdsourcing
- .....Instant messaging
- .....Internet of Things
- .....Internet security
- .....Internet telephony
- .....Internet topology
- .....Linked data
- .....Middleboxes
- .....Semantic Web
- .....Social computing
- .....Web 2.0
- .....Web services
- .....ISDN
- .....B-ISDN
- .....Local area networks
- .....Wireless LAN
- .....Metropolitan area networks
- .....Token networks
- .....Virtual artifact
- ....Distributed computing
- .....Client-server systems
- .....Middleware
- .....Servers
- .....Cluster computing
- .....Collaborative work
- .....Collaborative intelligence
- .....Cooperative communication
- .....Crowdsourcing
- .....Social computing
- .....Diffserv networks
- .....Distributed databases
- .....Distributed information systems
- .....Distributed management
- .....Publish-subscribe
- .....Internet
- .....Bot (Internet)
- .....Botnet
- .....Cloud computing
- .....Crowdsourcing
- .....Instant messaging
- .....Internet of Things
- .....Internet security
- .....Internet telephony
- .....Internet topology
- .....Linked data
- .....Middleboxes
- .....Semantic Web
- .....Social computing
- .....Web 2.0
- .....Web services
- .....Metacomputing
- .....Grid computing
- .....Peer-to-peer computing
- ....DNA computing
- ....File servers
- ....Hardware
- .....Hardware acceleration
- .....Input devices
- .....Open source hardware
- .....Reconfigurable devices
- .....Wireless access points
- ....High performance computing
- .....Exascale computing
- ....Image processing
- .....Active shape model
- .....Blob detection
- .....Corner detection
- .....Feature detection
- .....Feature extraction
- .....Fiducial markers
- .....Geophysical image processing
- .....Gray-scale
- .....Image analysis
- .....Image classification
- .....Image motion analysis
- .....Image quality
- .....Image sequence analysis
- .....Image texture analysis
- .....Object detection
- .....Subtraction techniques
- .....Image annotation
- .....Image capture





.....Image coding	.....Memory management
.....Image color analysis	.....Nonvolatile memory
.....Image decomposition	.....Nonvolatile single electron memory
.....Image denoising	.....Phase change memory
.....Image enhancement	.....Phase change random access memory
.....Image filtering	.....Random access memory
.....Image fusion	.....DRAM chips
.....Image recognition	.....Phase change random access memory
.....Image edge detection	.....Resistive RAM
.....Image reconstruction	.....SDRAM
.....Image registration	.....SRAM cells
.....Image representation	.....SRAM chips
.....Digital representation	.....Read only memory
.....Image resolution	.....PROM
.....High-resolution imaging	.....Read-write memory
.....Spatial resolution	.....Registers
.....Superresolution	.....Shift registers
.....Image restoration	.....Scanning probe data storage
.....Image sampling	.....Semiconductor memory
.....Image segmentation	.....Integrated memory circuits
.....Image segmentaton	...Mobile computing
.....Thresholding (Imaging)	.....Wireless access points
.....Image sequences	...Molecular computing
.....Image stitching	...Multitasking
.....Image synthesis	.....Parametric study
.....Human image synthesis	...Open systems
.....Image texture	.....Open Access
.....Machine vision	.....Public domain software
.....Object recognition	.....Open Educational Resources
.....Object segmentation	.....Physical layer
.....Morphological operations	.....Physical layer security
.....Optical feedback	...Optical computing
.....Pansharpener	...Parallel processing
.....Saliency detection	.....Multiprocessing systems
.....Smart pixels	.....Data flow computing
.....Spatial coherence	.....Processor scheduling
.....Structure from motion	.....Systolic arrays
.....Table lookup	.....Multithreading
...Memory	.....Parallel algorithms
.....Analog memory	.....Pipeline processing
.....Associative memory	...Pattern recognition
.....Buffer storage	.....Active shape model
.....Computer buffers	.....Activity recognition
.....Cache memory	.....Character recognition
.....Cache storage	.....Clustering methods
.....Content addressable storage	.....Pattern clustering
.....Flash memories	.....Data mining
.....Flash memory cells	.....Anomaly detection
.....Magnetic memory	.....Association rules
.....Floppy disks	
.....Hard disks	





.....Data privacy	.....Web services
.....Text analysis	.....Open source software
.....Text mining	.....Optical character recognition software
.....Web mining	.....Privacy-invasive software
.....Face recognition	.....Spyware
.....Fingerprint recognition	.....Public domain software
.....Gesture recognition	.....Python
.....Sign language	.....R language
.....Handwriting recognition	.....Software agents
.....Forgery	.....Agent-based modeling
.....Nearest neighbor methods	.....Autonomous agents
.....Pattern matching	.....Botnet
.....Image matching	.....Intelligent agents
.....Speech recognition	.....Software as a service
.....Automatic speech recognition	.....Software debugging
.....Speech analysis	.....Software design
.....Text recognition	.....Software maintenance
....Pervasive computing	.....Software packages
.....Ubiquitous computing	.....EMTDC
.....Context-aware services	.....PSCAD
.....Wearable computers	.....SPICE
.....Smart glasses	.....Software performance
....Petascale computing	.....Software quality
....Platform virtualization	.....Software reusability
....Probabilistic computing	.....Software safety
....Probability computing	.....Software systems
....Quantum computing	.....Software tools
.....Quantum algorithm	.....Authoring systems
.....Quantum cellular automata	.....System software
.....Quantum chemistry	.....File systems
.....Quantum circuit	.....Operating systems
.....Quantum networks	.....Program processors
.....Quantum simulation	.....Utility programs
.....Qubit	....Software engineering
....Real-time systems	.....Capability maturity model
.....Telexistence	.....Computer aided software engineering
.....WebRTC	.....Formal verification
....Software	.....Programming environments
.....Anti-virus software	.....Reasoning about programs
.....Application software	.....Release engineering
.....Embedded software	.....Runtime
.....Freeware	.....Dynamic compiler
.....Malware	.....Runtime environment
.....Computer viruses	.....Software architecture
.....Computer worms	.....Client-server systems
.....Ransomware	.....Deep architecture
.....Rootkit	.....Dew computing
.....Trojan horses	.....Microarchitecture
.....Middleware	.....Representational state transfer
.....Mediation	.....Restful API
.....Message-oriented middleware	.....Software libraries



- .....Software product lines
- ....System recovery
- .....Checkpointing
- .....Core dumps
- .....Debugging
- ....Time sharing computer systems
- ....Virtual machine monitors

### Consumer electronics

- ....Ambient intelligence
- ....Audio systems
  - .....3D audio
  - .....Audio tapes
  - .....Audio-visual systems
  - .....Auditory displays
  - .....Headphones
  - .....Immersive audio
  - .....Loudspeakers
  - .....Microphones
    - .....Microphone arrays
  - .....Pitch control (audio)
  - .....Portable media players
  - .....Sonification
  - .....Video description
- ....Home automation
  - .....Portable media players
  - .....Refrigerators
  - .....Smart homes
  - .....Washing machines
- ....Home computing
- ....Low-power electronics
- ....Microwave ovens
- ....Multimedia systems
  - .....Multimedia communication
    - .....Hypermedia
  - .....Multimedia computing
    - .....Multimedia Web sites
    - .....Multimedia databases

### Control systems

- ....Automatic control
  - .....Power generation control
- ....Automatic generation control
- ....Autopilot
- ....Bidirectional control
- ....Block signalling
- ....Brakes
- ....CAMAC
- ....Centralized control

- ....Closed loop systems
- ....Control design
- ....Control engineering
  - .....Control system security
    - .....Physical unclonable function
- ....Control equipment
  - .....Actuators
    - .....Dielectric elastomer actuators
    - .....Electrostatic actuators
    - .....Electrothermal actuators
    - .....Hydraulic actuators
    - .....Intelligent actuators
    - .....Microactuators
    - .....Piezoelectric actuators
    - .....Pneumatic actuators
  - .....Fasteners
  - .....Microcontrollers
  - .....Regulators
  - .....Remote control
  - .....Servosystems
    - .....Servomotors
  - .....Switches
    - .....Contactors
    - .....Microswitches
    - .....Optical switches
  - .....Switchgear
    - .....Circuit breakers
    - .....Interrupters
    - .....Relays
  - .....Telecontrol equipment
  - .....Thermostats
- ....Control system synthesis
- ....Controllability
- ....Cruise control
- ....Decentralized control
  - .....Consensus control
  - .....Distributed parameter systems
- ....Delay systems
  - .....Added delay
  - .....Delay lines
- ....Digital control
  - .....Programmable control
    - .....Flow graphs
- ....Fault tolerant control
- ....Feedback
  - .....Feedback circuits
    - .....Output feedback
    - .....Negative feedback
    - .....Neurofeedback
  - .....Feedback linearization
- ....Fluid flow control



- ....Fluidics
  - .....Microfluidics
  - .....Nanofluidics
- ....Gaze tracking
  - .....Electrooculography
- ....Homeostasis
- ....Linear feedback control systems
  - .....Frequency locked loops
  - .....Phase locked loops
  - .....State feedback
  - .....Tracking loops
- ....Magnetic variables control
- ....Mechanical variables control
  - .....Displacement control
  - .....Force control
  - .....Level control
    - .....Gyroscopes
  - .....Motion control
    - .....Collision avoidance
    - .....Collision mitigation
    - .....Kinetic theory
    - .....Motion planning
    - .....Path planning
    - .....Visual servoing
  - .....Pitch control (position)
  - .....Position control
    - .....Nanopositioning
  - .....Shape control
  - .....Size control
  - .....Strain control
  - .....Stress control
  - .....Thickness control
  - .....Torque control
  - .....Velocity control
    - .....Angular velocity control
  - .....Vibration control
  - .....Weight control
- ....Medical control systems
- ....Moisture control
  - .....Humidity control
- ....Motion compensation
- ....Networked control systems
- ....Nonlinear control systems
- ....Open loop systems
- ....Optical control
  - .....Lighting control
  - .....Optical variables control
- ....Optimal control
  - .....Bang-bang control
  - .....Infinite horizon
  - .....PD control
- ....PI control
  - .....Pneumatic systems
- ....Positive train control
- ....Pressure control
- ....Proportional control
- ....Radio control
- ....Robot control
  - .....Robot motion
- ....SCADA systems
- ....Sensorless control
- ....Sliding mode control
- ....Supervisory control
  - .....SCADA systems
- ....Thermal variables control
  - .....HVAC
    - .....Temperature control
      - .....Cooling
        - .....Heating systems
  - .....Thermal analysis
    - .....Thermomechanical processes
- ....Traffic control
  - .....Queueing analysis
  - .....Road traffic control
  - .....Vehicle routing

### Dielectrics and electrical insulation

- ....Dielectrics
  - .....Dielectric constant
    - .....High-k gate dielectrics
  - .....Dielectric devices
    - .....Capacitors
      - .....Ferroelectric devices
      - .....Piezoelectric devices
      - .....Pyroelectric devices
  - .....Dielectric losses
  - .....Dielectric substrates
  - .....Dielectrophoresis
  - .....Electrohydrodynamics
  - .....Electrokinetics
  - .....Electrostriction
- ....Electric breakdown
  - .....Avalanche breakdown
    - .....Corona
      - .....Dielectric breakdown
        - .....Arc discharges
          - .....Discharges (electric)
            - .....Electrostatic discharges
              - .....Flashover
                - .....Glow discharges
                  - .....Partial discharges



- .....Surface discharges
- .....Vacuum breakdown
- .....Sparks
- ....Insulation
- .....Cable insulation
- .....Power cable insulation
- .....Ceramics
- .....Bioceramics
- .....Porcelain
- .....Gas insulation
- .....Sulfur hexafluoride
- .....Insulators
- .....Metal-insulator structures
- .....Plastic insulators
- .....Rubber
- .....Topological insulators
- .....Trees - insulation
- .....Isolation technology
- .....Oil insulation
- .....Oil filled cables
- .....Plastic insulation

## Education

- ....Adaptive learning
- ....Career development
- .....Continuing education
- .....Jobs listings
- .....Mentoring
- ....Educational courses
- .....Curriculum development
- .....Open Educational Resources
- ....Educational institutions
- ....Educational programs
- .....Accreditation
- .....Continuing education
- .....Pre-college engineering
- .....Scholarships
- .....Self-study courses
- .....Seminars
- .....Webinars
- .....STEM
- .....Tutorials
- ....Educational technology
- .....Computer aided instruction
- .....Learning management systems
- .....Courseware
- .....Electronic learning
- .....Mobile learning
- ....Engineering education
- .....Biomedical engineering education

- .....Communication engineering education
- .....Computer science education
- .....Control engineering education
- .....Electrical engineering education
- .....Electronics engineering education
- .....Engineering students
- .....Physics education
- .....Power engineering education
- .....Student experiments
- .....Systems engineering education
- ....Training
- .....Certification
- .....Industrial training
- .....Management training
- .....On the job training
- .....Qualifications
- .....Vocational training

## Electromagnetic compatibility and interference

- ....Electromagnetic compatibility
- .....Immunity testing
- .....Reverberation chambers
- ....Electromagnetics
- .....Electromagnetic analysis
- .....Air gaps
- .....Characteristic mode analysis
- .....Computational electromagnetics
- .....Delay effects
- .....Electromagnetic fields
- .....Electromagnetic forces
- .....Electromagnetic refraction
- .....Permeability
- .....Spark gaps
- .....Time-domain analysis
- .....Electromagnetic coupling
- .....Mutual coupling
- .....Optical coupling
- .....Electromagnetic devices
- .....Baluns
- .....Electromagnetic induction
- .....Eddy currents
- .....Inductive power transmission
- .....Electromagnetic metamaterials
- .....Terahertz metamaterials
- .....Electromagnetic radiation
- .....Bremsstrahlung
- .....Correlators
- .....Electromagnetic wave absorption
- .....Frequency



- .....Gamma-rays
  - .....Line-of-sight propagation
  - .....Terahertz radiation
  - .....Electromagnetic shielding
  - .....Cable shielding
  - .....Magnetic shielding
  - .....Electromagnetic transients
  - .....EMP radiation effects
  - .....EMTDC
  - .....EMTP
  - .....Power system transients
  - .....Surges
  - .....Proximity effects
  - ....Interference
  - .....Clutter
  - .....Crosstalk
  - .....Diffraction
  - .....Echo interference
  - .....Electromagnetic interference
  - .....Radiofrequency interference
  - .....Specific absorption rate
  - .....Electromagnetic radiative interference
  - .....Electrostatic interference
  - .....Immunity testing
  - .....Interchannel interference
  - .....Interference cancellation
  - .....Interference channels
  - .....Interference constraints
  - .....Interference elimination
  - .....Interference suppression
  - .....Intersymbol interference
  - .....Rain fading
  - .....Terrain factors
  - .....TV interference
  - .....Micromotors
  - .....Micropumps
  - .....Microvalves
  - .....Radiofrequency
  - microelectromechanical systems
  - ....Microfluidics
  - ....Micromechanical devices
  - .....Biomedical microelectromechanical systems
  - .....Fluidic microsystems
  - .....Microfabrication
  - ....Photoelectricity
  - .....Photovoltaic effects
  - .....Shunts (electrical)
  - ....Photovoltaic cells
  - .....Light trapping
  - ....Quantum computing
  - .....Quantum algorithm
  - .....Quantum cellular automata
  - .....Quantum chemistry
  - .....Quantum circuit
  - .....Quantum networks
  - .....Quantum simulation
  - .....Qubit
  - ....Quantum well devices
  - .....Quantum well lasers
  - .....Quantum cascade lasers
  - .....Quantum wells
  - .....Two dimensional hole gas
  - ....Semiconductivity
  - ....Semiconductor devices
  - .....Flip-chip devices
  - .....Gunn devices
  - .....Hall effect devices
  - .....Junctions
  - .....Heterojunctions
  - .....Hybrid junctions
  - .....P-n junctions
  - .....Waveguide junctions
  - .....MIS devices
  - .....Charge coupled devices
  - .....MOS devices
  - .....MONOS devices
  - .....Piezoresistive devices
  - .....P-i-n diodes
  - .....Power semiconductor devices
  - .....Power transistors
  - .....Power semiconductor switches
  - .....Bipolar transistors
  - .....Thyristors
  - .....Quantum dots
- Electron devices**
- ....Cathode ray tubes
  - ....Electron guns
  - ....Electron multipliers
  - ....Electron tubes
  - .....Field emitter arrays
  - .....Klystrons
  - .....Magnetrons
  - .....Thyratrons
  - .....Traveling wave tubes
  - ....Mechatronics
  - .....Biomechatronics
  - ....Microelectromechanical systems
  - .....Microelectromechanical devices
  - .....Microactuators



- .....Quantum well lasers
- .....Quantum cascade lasers
- .....Schottky diodes
- .....Semiconductor counters
- .....Semiconductor detectors
- .....Semiconductor device modeling
- .....Semiconductor device noise
- .....Semiconductor diodes
  - .....P-i-n diodes
  - .....Schottky diodes
  - .....Semiconductor-metal interfaces
  - .....Superluminescent diodes
  - .....Varactors
- .....Semiconductor lasers
  - .....Laser tuning
  - .....Quantum dot lasers
  - .....Quantum well lasers
  - .....Semiconductor laser arrays
  - .....Semiconductor optical amplifiers
  - .....Surface emitting lasers
- .....Semiconductor waveguides
- .....Semiconductor-insulator interfaces
- .....Silicon devices
- .....SONOS devices
- .....Superluminescent diodes
- .....Surface emitting lasers
- .....Vertical cavity surface emitting lasers
- .....Thermistors
- .....Transistors
  - .....Field effect transistors
  - .....Heterojunction bipolar transistors
  - .....Millimeter wave transistors
  - .....Phototransistors
  - .....Static induction transistors
- ....Single electron devices
  - .....Single electron memory
  - .....Hetero-nanocrystal memory
  - .....Single electron transistors
- ....Thick film devices
  - .....Thick film inductors
- ....Thin film devices
  - .....Film bulk acoustic resonators
  - .....Thin film inductors
  - .....Thin film transistors
  - .....Organic thin film transistors
- ....Tunneling
  - .....Gate leakage
  - .....Josephson effect
  - .....Magnetic tunneling
  - .....Resonant tunneling devices

- .....Superconductive tunneling
- .....Tunneling magnetoresistance
- ...Vacuum technology
  - .....Photomultipliers
  - .....Vacuum electronics
  - .....Vacuum systems
  - .....Gettering

### **Electronic design automation and methodology**

- ....Design automation
  - .....CAD/CAM
  - .....Logic design
  - .....Reconfigurable logic
  - .....PSCAD
- ....Design methodology
  - .....Design for disassembly
  - .....Design for experiments
  - .....Design for manufacture
  - .....Design for quality
  - .....Design for testability
  - .....Design standards
  - .....Design tools
  - .....Graphics
    - .....Animation
    - .....Art
    - .....Character generation
    - .....Computer graphics
    - .....Engineering drawings
    - .....Layout
    - .....Shape
    - .....Symbols
    - .....Virtual reality
    - .....Visualization
  - .....Green design
    - .....Ecodesign
    - .....Green computing
  - .....Integrated design
    - .....Process design
    - .....Pattern formation
    - .....Process modeling
  - .....Product design
    - .....Prototypes
      - .....Breadboard
      - .....Rapid prototyping
    - .....Technical drawing
    - .....Time to market
    - .....User centered design
    - .....Virtual prototyping



**Engineering – general**

- ....Acoustical engineering
- ....Agricultural engineering
- ....Bio-inspired engineering
  - .....Bio-inspired computing
  - .....Bio-inspired control
  - .....Bio-inspired robotics
- ....Chemical engineering
- ....Civil engineering
  - .....Geotechnical engineering
    - .....Excavation
    - .....Geotechnical structures
      - .....Dams
    - .....Railway engineering
      - .....Railway safety
    - .....Structural engineering
      - .....Offshore installations
  - ....Concurrent engineering
  - ....Design engineering
    - .....Design tools
  - ....Electrical engineering
    - .....Electrical engineering computing
  - ....Engineering profession
    - .....Professional aspects
  - ....Environmental engineering
  - ....Maintenance engineering
    - .....Maintenance management
    - .....Predictive maintenance
    - .....Preventive maintenance
      - .....Condition monitoring
    - .....Systems support
  - ....Mechanical engineering
    - .....Mechanical power transmission
      - .....Torque converters
    - .....Mechanical systems
      - .....Mechanical energy
      - .....Micromechanical devices
      - .....Suspensions (mechanical systems)
  - ....Optical engineering
  - ....Precision engineering
  - ....Production engineering
    - .....Production planning
      - .....Capacity planning
      - .....Materials requirements planning
      - .....Process planning
  - ....Research and development
  - ....Translational research
  - ....Reverse engineering
  - ....Sanitary engineering
  - ....Standardization

- .....Formal specifications
- .....Guidelines
- .....Standards
  - .....Standards categories
  - .....Standards organizations
  - .....Standards publications
- ....Thermal engineering

**Engineering in medicine and biology**

- ....Biology
  - .....Biochemistry
    - .....Amino acids
    - .....Biochemical analysis
    - .....Peptides
    - .....Proteins
      - .....Receptor (biochemistry)
  - .....Biodiversity
  - .....Biogeography
  - .....Bioelectric phenomena
    - .....Electric shock
  - .....Biological cells
    - .....Cell signaling
    - .....Cells (biology)
    - .....Chromosome mapping
    - .....Endothelial cells
    - .....Fibroblasts
    - .....RNA
    - .....Stem cells
  - .....Biological information theory
  - .....Biological processes
    - .....Biological interactions
    - .....Chronobiology
    - .....Circadian rhythm
    - .....Coagulation
    - .....Molecular biology
      - .....Symbiosis
  - .....Biological system modeling
  - .....Biological systems
    - .....Anatomy
    - .....Molecular communication (telecommunication)
    - .....Organisms
    - .....Biology computing
    - .....Biophotonics
    - .....Biophysics
      - .....Aerospace biophysics
      - .....Biomagnetics
      - .....Cellular biophysics
      - .....Molecular biophysics
    - .....Cryobiology





|   |                                    |
|---|------------------------------------|
| .....Evolution (biology)                  | .....Cloning                       |
| .....Memetics                             | .....Drug delivery                 |
| .....Phylogeny                            | .....Targeted drug delivery        |
| .....Genetics                             | .....Neural engineering            |
| .....DNA                                  | .....Neural circuits               |
| .....Epigenetics                          | .....Neural microtechnology        |
| .....Gene therapy                         | .....Neural nanotechnology         |
| .....Genetic communication                | .....Neural prosthesis             |
| .....Genetic expression                   | .....Protein engineering           |
| .....Genetic programming                  | .....Tissue engineering            |
| .....Genomics                             | .....Regeneration engineering      |
| .....Homeostasis                          | .....Translational research        |
| .....Mechanobiology                       | ...Biomedical equipment            |
| .....Microbiology                         | .....Assistive technology          |
| .....Electroporation                      | .....Assistive devices             |
| .....Virology                             | .....Closed captioning             |
| .....Microinjection                       | .....Video description             |
| .....Nanobioscience                       | .....Wheelchairs                   |
| .....DNA computing                        | .....Biomedical electrodes         |
| .....Nanobiotechnology                    | .....Biomedical telemetry          |
| .....Physiology                           | .....Biomedical transducers        |
| .....Action potentials                    | .....Catheters                     |
| .....External stimuli                     | .....Endoscopes                    |
| .....Neuromodulation                      | .....Endomicroscopy                |
| .....Predator prey systems                | .....Gerontechnology               |
| .....Synthetic biology                    | .....Hypodermic needles            |
| .....Systematics                          | .....Implants                      |
| .....Systems biology                      | .....Auditory implants             |
| .....Vegetation                           | .....Brainstem implants            |
| .....Crops                                | .....Cochlear implants             |
| .....Marine vegetation                    | .....Microelectronic implants      |
| .....Zoology                              | .....Neural implants               |
| .....Animals                              | .....Intracranial pressure sensors |
| .....Entomology                           | .....Lithotriptors                 |
| ...Biomedical communication               | .....Medical devices               |
| .....Biomedical telemetry                 | .....Medical instruments           |
| .....Telemedicine                         | .....Pacemakers                    |
| ...Biomedical computing                   | .....Pulse oximeter                |
| .....Bioinformatics                       | .....Stethoscope                   |
| .....Neuroinformatics                     | .....Surgical instruments          |
| .....Medical expert systems               | .....Laparoscopes                  |
| .....Medical information systems          | .....Ventilators                   |
| .....Electronic medical records           | ...Biomedical imaging              |
| ...Biomedical engineering                 | .....Angiocardiology               |
| .....Bioimpedance                         | .....Angiography                   |
| .....Biological techniques                | .....Biomedical optical imaging    |
| .....Biomedical applications of radiation | .....Cardiography                  |
| .....Biomedical electronics               | .....Echocardiography              |
| .....Biomedical signal processing         | .....Electrocardiography           |
| .....Biomedical image processing          | .....Phonocardiography             |
| .....Biotechnology                        | .....DICOM                         |





|                                    |                                       |
|------------------------------------|---------------------------------------|
| .....Elastography                  | .....Tumors                           |
| .....Encephalography               | .....Medical diagnosis                |
| .....Mammography                   | .....Autopsy                          |
| .....Medical diagnostic imaging    | .....Bronchoscopy                     |
| .....Anatomical structure          | .....Colonography                     |
| .....Molecular imaging             | .....Computer aided diagnosis         |
| .....Phantoms                      | .....Medical signal detection         |
| .....Photoacoustic imaging         | .....Nanomedicine                     |
| .....Bionanotechnology             | .....Plethysmography                  |
| .....Bioterrorism                  | .....Sensitivity and specificity      |
| .....Computational biology         | .....Medical tests                    |
| .....Computational biochemistry    | .....Amniocentesis                    |
| .....Computational biophysics      | .....Biopsy                           |
| .....Computational systems biology | .....Cancer detection                 |
| .....Genetic engineering           | .....Colonoscopy                      |
| .....Medical services              | .....Pregnancy test                   |
| .....Assisted living               | .....Medical treatment                |
| .....Ambient assisted living       | .....Anesthesia                       |
| .....Catheterization               | .....Angioplasty                      |
| .....Clinical diagnosis            | .....Brachytherapy                    |
| .....Clinical neuroscience         | .....Brain stimulation                |
| .....Cybercare                     | .....Cancer treatment                 |
| .....Electronic healthcare         | .....Chemotherapy                     |
| .....Health information management | .....Clinical trials                  |
| .....Hospitals                     | .....Cryotherapy                      |
| .....In vitro                      | .....Defibrillation                   |
| .....In vitro fertilization        | .....Dentistry                        |
| .....In vivo                       | .....Electrical stimulation           |
| .....Medical conditions            | .....Electronic medical prescriptions |
| .....Aneurysm                      | .....Electroporation                  |
| .....Atrophy                       | .....Embolization                     |
| .....Autism                        | .....Fibrillation                     |
| .....Blindness                     | .....Geriatrics                       |
| .....Cataracts                     | .....Hepatectomy                      |
| .....Congestive heart failure      | .....Hospitals                        |
| .....Cybersickness                 | .....Hyperthermia                     |
| .....Deafness                      | .....Intubation                       |
| .....Depression                    | .....Lithotripsy                      |
| .....Diabetes                      | .....Magnetic stimulation             |
| .....Diseases                      | .....Neuromuscular stimulation        |
| .....Hemorrhaging                  | .....Neutron capture therapy          |
| .....Hypertension                  | .....Noninvasive treatment            |
| .....Hyperthermia                  | .....Orthopedic procedures            |
| .....Injuries                      | .....Orthotics                        |
| .....Kidney stones                 | .....Patient rehabilitation           |
| .....Obesity                       | .....Pharmaceuticals                  |
| .....Paralysis                     | .....Precision medicine               |
| .....Pregnancy                     | .....Proton therapy                   |
| .....Sleep apnea                   | .....Surgery                          |
| .....Stroke (medical condition)    | .....Occupational medicine            |
| .....Thrombosis                    | .....Point of care                    |



|                                   |   |
|-----------------------------------|---|
| .....Prosthetics                  | .....Business continuity                            |
| .....Artificial biological organs | .....Business process management                    |
| .....Artificial limbs             | .....Business process re-engineering                |
| .....Prosthetic hand              | .....Communication system operations and management |
| .....Prosthetic limbs             | .....Conference management                          |
| .....Visual prosthesis            | .....Content management                             |
| .....Public healthcare            | .....Contingency management                         |
| .....Sensory aids                 | .....Contract management                            |
| .....Hearing aids                 | .....Contracts                                      |
| .....Smart healthcare             | .....Customer relationship management               |
| .....Vaccines                     | .....Decision making                                |
| .....X-rays                       | .....Dependability management                       |
| .....X-ray applications           | .....Distributed management                         |
| .....X-ray detection              | .....Enterprise resource planning                   |
| .....X-ray scattering             | .....Facilities management                          |
| .....X-ray tomography             | .....Financial management                           |
| ...Medical specialties            | .....Governmental factors                           |
| .....Anesthesiology               | .....Human resource management                      |
| .....Cardiology                   | .....Information management                         |
| .....Cardiac tissue               | .....Interface management                           |
| .....Dermatology                  | .....International collaboration                    |
| .....Gastroenterology             | .....Knowledge management                           |
| .....Gerontology                  | .....Marketing management                           |
| .....Gerontechnology              | .....Organizational aspects                         |
| .....Gynecology                   | .....Outsourcing                                    |
| .....Neonatology                  | .....Process planning                               |
| .....Neurology                    | .....Production management                          |
| .....Oncology                     | .....Program management                             |
| .....Ophthalmology                | .....Project management                             |
| .....Pathology                    | .....Public relations                               |
| .....Histopathology               | .....Quality management                             |
| .....Neuropathology               | .....Requirements management                        |
| .....Pathological processes       | .....Research and development management            |
| .....Pediatrics                   | .....Resource management                            |
| .....Pulmonology                  | .....Risk analysis                                  |
| ...Nuclear medicine               | .....Safety management                              |
| ...Synthetic biology              | .....Security management                            |
| <b>Engineering management</b>     | .....Storage management                             |
| ....Business                      | .....Supply chain management                        |
| .....Business data processing     | .....Technical management                           |
| .....Business intelligence        | .....Technology management                          |
| .....Disruptive innovation        | .....Operations research                            |
| .....Entrepreneurship             | .....Inventory control                              |
| .....Franchising                  | .....Virtual enterprises                            |
| .....Industrial relations         | .....Organizations                                  |
| .....Management                   | .....BNSC   |
| .....Asset management             | .....Companies                                      |
| .....Best practices               | .....Government                                     |
| .....Building management systems  | .....Sociotechnical systems                         |



|   |   |
|---|---|
| .....United Kingdom Space Agency              | .....Patent law                         |
| ....Commercialization                         | .....Trademarks                         |
| ....Consortia                                 | .....Patents                            |
| ....Economics                                 | .....Product liability                  |
| .....Access charges                           | .....Warranties                         |
| .....Costs                                    | .....Software protection                |
| .....Cost benefit analysis                    | .....Trademarks                         |
| .....Developing countries                     | ....Market research                     |
| .....Econometrics                             | ....Planning                            |
| .....Economic forecasting                     | .....Meeting planning                   |
| .....Economic indicators                      | .....Schedules                          |
| .....Share prices                             | .....Strategic planning                 |
| .....Electronic commerce                      | .....Roadmaps (technology planning)     |
| .....Environmental economics                  | .....Technical planning                 |
| .....Carbon tax                               | .....Technology planning                |
| .....Emissions trading                        | ....Product development                 |
| .....Exchange rates                           | .....Graphical user interfaces          |
| .....Fuel economy                             | .....Avatars                            |
| .....International trade                      | .....Product customization              |
| .....Macroeconomics                           | .....Product lifecycle management       |
| .....Privatization                            | .....Prognostics and health management  |
| .....Microeconomics                           | .....Software product lines             |
| .....Economies of scale                       | .....Time to market                     |
| .....Industrial economics                     | ....Project engineering                 |
| .....Monopoly                                 | .....Scheduling                         |
| .....Oligopoly                                | .....Adaptive scheduling                |
| .....Power generation economics               | .....Dynamic scheduling                 |
| .....Electricity supply industry deregulation | .....Job shop scheduling                |
| .....Profitability                            | .....Single machine scheduling          |
| .....Sharing economy                          | .....Turnkey project                    |
| .....Stock markets                            | ....Research and development management |
| .....Supply and demand                        | .....Innovation management              |
| .....Trade agreements                         | .....Creativity                         |
| .....Venture capital                          | ....Research initiatives                |
| .....Virtual enterprises                      | ....Software development management     |
| ....Innovation management                     | .....Agile software development         |
| .....Creativity                               | .....Scrum (Software development)       |
| ....Legal factors                             | .....Model-driven development           |
| .....Copyright protection                     |   |
| .....Intellectual property                    |   |
| .....Software protection                      |   |
| .....Law                                      |   |
| .....Censorship                               |   |
| .....Commercial law                           |   |
| .....Consumer protection                      |   |
| .....Contract law                             |   |
| .....Criminal law                             |   |
| .....Employment law                           |   |
| .....Forensics                                |   |
| .....Law enforcement                          |   |
|   | <b>Geoscience and remote sensing</b>    |
|   | ....Environmental factors               |
|   | .....Biosphere                          |
|   | .....Climate change                     |
|   | .....Global warming                     |
|   | .....Ecology                            |
|   | .....Ecosystems                         |
|   | .....Wetlands                           |
|   | .....Environmental economics            |



|                                       |                                 |
|---------------------------------------|---------------------------------|
| .....Carbon tax                       | .....Earth                      |
| .....Emissions trading                | .....Earthquakes                |
| .....Environmental monitoring         | .....Earthquake engineering     |
| .....Global warming                   | .....Forestry                   |
| .....Green manufacturing              | .....Geochemistry               |
| .....Green products                   | .....Geoengineering             |
| .....Green buildings                  | .....Geography                  |
| .....Green cleaning                   | .....Rural areas                |
| .....Green transportation             | .....Urban areas                |
| .....Pollution                        | .....Geology                    |
| .....Air pollution                    | .....Landslides                 |
| .....Emissions trading                | .....Minerals                   |
| .....Industrial pollution             | .....Rocks                      |
| .....Land pollution                   | .....Geophysics                 |
| .....Oil pollution                    | .....EMTDC                      |
| .....Radioactive pollution            | .....Extraterrestrial phenomena |
| .....Thermal pollution                | .....Geodynamics                |
| .....Urban pollution                  | .....Geophysics computing       |
| .....Water pollution                  | .....Meteorology                |
| ...Geographic information systems     | .....Moisture                   |
| .....Geospatial analysis              | .....Seismology                 |
| .....Gunshot detection systems        | .....Surface waves              |
| ...Geophysical measurement techniques | .....Well logging               |
| .....Geophysical image processing     | .....Ice                        |
| .....Geophysical measurements         | .....Ice shelf                  |
| .....Geodesy                          | .....Ice surface                |
| .....Level measurement                | .....Ice thickness              |
| .....Sea measurements                 | .....Sea ice                    |
| .....Geoacoustic inversion            | .....Lakes                      |
| .....Seismic measurements             | .....Land surface               |
| ...Geophysical signal processing      | .....Levee                      |
| ...Geoscience                         | .....Meteorological factors     |
| .....Antarctica                       | .....Oceanography               |
| .....South Pole                       | .....Ocean circulation          |
| .....Arctic                           | .....Oceans                     |
| .....North Pole                       | .....Ocean salinity             |
| .....Atmosphere                       | .....Ocean temperature          |
| .....Air quality                      | .....Sea coast                  |
| .....Atmospheric modeling             | .....Sea floor                  |
| .....Atmospheric waves                | .....Sea level                  |
| .....Biosphere                        | .....Sea surface                |
| .....Continents                       | .....Tides                      |
| .....Africa                           | .....Rivers                     |
| .....Asia                             | .....Sediments                  |
| .....Australia                        | .....Soil                       |
| .....Europe                           | .....Soil moisture              |
| .....North America                    | .....Soil properties            |
| .....South America                    | .....Soil texture               |
| .....Cyclones                         | .....Tornadoes                  |
| .....Hurricanes                       | .....Tsunami                    |
| .....Tropical cyclones                | .....Volcanoes                  |



- .....Planetary volcanoes
- .....Volcanic activity
- .....Volcanic ash
- .....Wetlands
- ....Land surface temperature
- ....Photometry
- ....Radar
  - .....Airborne radar
  - .....Bistatic radar
  - .....Cognitive radar
  - .....Doppler radar
  - .....Ground penetrating radar
  - .....High frequency radar
  - .....Laser radar
  - .....Meteorological radar
  - .....Millimeter wave radar
  - .....Multistatic radar
  - .....MIMO radar
  - .....Passive radar
  - .....Quantum radar
  - .....Radar applications
    - .....Radar countermeasures
    - .....Radar detection
    - .....Radar imaging
    - .....Radar measurements
    - .....Radar polarimetry
    - .....Radar remote sensing
    - .....Radar tracking
  - .....Radar clutter
  - .....Radar cross-sections
  - .....Radar equipment
  - .....Radar theory
  - .....Spaceborne radar
  - .....Spread spectrum radar
  - .....Synthetic aperture radar
    - .....Inverse synthetic aperture radar
    - .....Polarimetric synthetic aperture radar
  - .....Ultra wideband radar
- ....Radiometry
  - .....Microwave radiometry
  - .....Radiometers
    - .....Spectroradiometers
- ....Remote sensing
  - .....Hyperspectral sensors
    - .....Hyperspectral imaging
  - .....Passive microwave remote sensing
  - .....Quantum radar
  - .....Remote monitoring
- ....Terrain mapping
- .....Digital elevation models

- ....Terrestrial atmosphere
  - .....Clouds
  - .....Global warming
  - .....Ionosphere
  - .....Magnetosphere
- ....Vegetation mapping

### IEEE organization

- ....IEEE activities
  - .....IEEE Awards activities
    - .....IEEE Corporate awards
    - .....IEEE Society awards
    - .....IEEE Standards awards
    - .....IEEE Student awards
    - .....National Society Agreement awards
  - .....IEEE Conference activities
  - .....IEEE Corporate activities
    - .....Humanitarian activities
  - .....IEEE Educational activities
  - .....IEEE Intersociety activities
  - .....IEEE Local activities
  - .....IEEE Member and Geographic activities
  - .....IEEE Professional activities
  - .....IEEE publishing
  - .....IEEE Standards activities
  - .....IEEE Student activities
  - .....IEEE Technical activities
  - .....IEEE United States activities
  - .....IEEE Volunteer activities
- ....IEEE entities
  - .....IEEE Boards
  - .....IEEE Center for the History of Electrical Engineering
  - .....IEEE Chapters
  - .....IEEE Committees
  - .....IEEE Communities
  - .....IEEE Computer Society Press
  - .....IEEE Councils
  - .....IEEE Foundation
  - .....IEEE Press
  - .....IEEE Regions
  - .....IEEE Sections
  - .....IEEE Societies
  - .....IEEE governance
    - .....IEEE bylaws
    - .....IEEE Constitution
    - .....IEEE mission and vision
    - .....IEEE policy and procedures
    - .....IEEE staff



- ....IEEE indexing
- .....Awards
- .....Book reviews
- .....CD-ROM reviews
- .....Interviews
- .....Obituaries
- .....Software reviews
- .....Special issues and sections
- .....Tutorials
- .....Video reviews
- ...IEEE members
- .....IEEE Associate Members
- .....IEEE Fellows
- .....IEEE Life Members
- .....IEEE Senior Members
- .....IEEE Student Members
- ...IEEE news
- .....IEEE Chapter news
- .....IEEE Region news
- .....IEEE Section news
- .....IEEE Society news
- ...IEEE products
- .....IEEE audio tapes
- .....IEEE catalogs
- .....IEEE Collabratec
- .....IEEE educational products
- .....IEEE merchandise
- .....IEEE publications
- .....IEEE books
- .....IEEE conference proceedings
- .....IEEE directories
- .....IEEE journals
- .....IEEE magazines
- .....IEEE newsletters
- .....IEEE online publications
- .....IEEE standards publications
- .....IEEE transactions
- .....Notice of Violation
- .....IEEE Xplore
- .....IEL
- .....DICOM
- .....Elastography
- .....Encephalography
- .....Mammography
- .....Medical diagnostic imaging
- .....Anatomical structure
- .....Molecular imaging
- .....Phantoms
- .....Photoacoustic imaging
- ...Cameras
- .....Digital cameras
- .....Smart cameras
- .....Webcams
- ...Focusing
- ...Ground penetrating radar
- ...Holography
- ...Image converters
- .....Image intensifiers
- ...Image sensors
- .....Active pixel sensors
- .....CCD image sensors
- .....Charge-coupled image sensors
- .....CMOS image sensors
- .....Infrared image sensors
- ...Image storage
- ...Infrared imaging
- .....Night vision
- ...Magnetic resonance imaging
- .....Diffusion tensor imaging
- .....Functional magnetic resonance imaging
- .....Magnetic resonance elastography
- .....Magnetic resonance fingerprinting
- ...Magneto electrical resistivity imaging technique
- ...Microscopy
- .....Atomic force microscopy
- .....Electron microscopy
- .....Photoelectron microscopy
- .....Scanning electron microscopy
- .....Transmission electron microscopy
- .....Endomicroscopy
- .....Scanning microwave microscopy
- .....Scanning probe microscopy
- .....Scanning thermal microscopy
- ...Microwave imaging
- ...Multispectral imaging
- ...Nuclear imaging
- .....Energy resolution
- .....Ion emission
- ...Optical imaging

## Imaging

- ...Biomedical imaging
- .....Angiocardiology
- .....Angiography
- .....Biomedical optical imaging
- .....Cardiology
- .....Echocardiography
- .....Electrocardiography
- .....Phonocardiography



- .....Optical flow
  - .....Optical projectors
  - .....Talbot effect
  - .....Thermoreflectance imaging
  - ....Photography
  - .....Cinematography
  - .....Digital photography
  - .....Image forensics
  - .....Photomicrography
  - .....Photorealism
  - ....Radiation imaging
  - ....Radiography
  - .....Diagnostic radiography
  - ....Stereo vision
  - .....Stereo image processing
  - ....Terahertz wave imaging
  - ....Tomography
  - .....Computed tomography
  - .....Single photon emission computed tomography
  - .....Electrical capacitance tomography
  - .....Electrical impedance tomography
  - .....Optical coherence tomography
  - .....Positron emission tomography
  - .....Whole-body PET
  - .....Reconstruction algorithms
- Industrial electronics**
- ....Assembly systems
  - .....Flexible electronics
  - .....Robotic assembly
  - ....Computer aided manufacturing
  - .....CAD/CAM
  - .....Silicon compiler
  - ....Cryogenic electronics
  - ....Industrial control
  - .....Process control
  - .....Predictive control
  - .....Three-term control
  - .....Two-term control
  - .....Production control
  - .....Continuous production
  - .....Lot sizing
  - .....Optimized production technology
  - .....Scheduling
  - ....Integrated manufacturing systems
  - ....Machine control
  - .....Machine vector control
  - ....Manufacturing automation
  - .....Computer aided manufacturing
  - .....CAD/CAM
  - .....Silicon compiler
  - .....Computer integrated manufacturing
  - .....Computer numerical control
  - .....Flexible manufacturing systems
  - ....Testing
  - .....Aerospace testing
  - .....Wind tunnels
  - .....Automatic testing
  - .....Automatic test pattern generation
  - .....Ring generators
  - .....Benchmark testing
  - .....Built-in self-test
  - .....Circuit testing
  - .....Integrated circuit measurements
  - .....Conformance testing
  - .....Electronic equipment testing
  - .....Immunity testing
  - .....Error analysis
  - .....Bit error rate
  - .....Finite wordlength effects
  - .....Error-free operations
  - .....Failure analysis
  - .....Equipment failure
  - .....Semiconductor device breakdown
  - .....Frequency response
  - .....Impulse testing
  - .....Insulator testing
  - .....Insulation testing
  - .....Integrated circuit testing
  - .....Integrated circuit yield
  - .....Logic testing
  - .....Life testing
  - .....Materials testing
  - .....Accelerated aging
  - .....Acoustic testing
  - .....Adhesive strength
  - .....Bonding forces
  - .....Delamination
  - .....Elastic recovery
  - .....Nondestructive testing
  - .....Optical fiber testing
  - .....Remaining life assessment
  - .....Ring generators
  - .....Semiconductor device testing
  - .....Software testing
  - .....Combinatorial testing
  - .....Fuzzing
  - .....System testing
  - .....Model checking
  - .....Test equipment





- .....Automatic test equipment
- .....Test facilities
- .....Anechoic chambers
- .....Laboratories
- .....Large Hadron Collider
- .....Open area test sites
- .....TEM cells
- .....Wind tunnels

### Industry applications

- ....Accident prevention
- .....Accidents
- .....Aerospace accidents
- .....Electrical accidents
- .....Industrial accidents
- .....Marine accidents
- .....Railway accidents
- .....Road accidents
- ....Chemical technology
- .....Chemical reactors
- .....Bioreactors
- .....Catalysis
- .....Continuous-stirred tank reactor
- .....Ignition
- .....Chemical sensors
- .....Crystallizers
- .....Distillation equipment
- .....Fluidization
- .....Pharmaceutical technology
- .....Vitrification
- ....Cryogenics
- .....Liquid nitrogen
- ....Electrochemical devices
- .....Amperometric sensors
- .....Batteries
- .....Lead acid batteries
- .....Lithium batteries
- .....Lithium-ion batteries
- .....Lithium-sulfur batteries
- .....Nickel cadmium batteries
- .....Solid state batteries
- .....Battery management systems
- .....Fuel cells
- .....Supercapacitors
- ....Electrochemical processes
- ....Electromechanical systems
- .....Cruise control
- .....Electromechanical devices
- .....Armature
- .....SAW filters

- ....Electrostatic devices
- ....Electrostatic precipitators
- ....Electrostatic processes
- .....Aerosols
- .....Electrophotography
- .....Electrostatic analysis
- .....Electrostatic induction
- .....Electrostatics
- .....Electrostatic levitation
- .....Particle charging
- .....Particle production
- .....Space charge
- .....Surface charging
- .....Triboelectricity
- .....Triboelectricity
- ....Engines
- .....Heat engines
- .....Steam engines
- .....Stirling engines
- .....Internal combustion engines
- .....Diesel engines
- .....Ignition
- .....Jet engines
- ....Environmental management
- .....Biodegradation
- .....Biodegradable materials
- .....Land use planning
- .....Pest control
- .....Pollution control
- .....Recycling
- .....Renewable energy sources
- .....Biomass
- .....Sustainable development
- .....Waste management
- .....Waste disposal
- .....Waste handling
- .....Waste recovery
- .....Waste reduction
- .....Water conservation
- .....Desalination
- .....Water resources
- .....Desalination
- .....Reservoirs
- .....Water monitoring
- ....Food technology
- .....Food preservation
- ....High-temperature techniques
- .....Rapid thermal processing
- ....Industrial engineering
- .....Industrial communication
- ....Industries





|                                      |                                    |
|--------------------------------------|------------------------------------|
| .....Agriculture                     | .....Coal mining                   |
| .....Agricultural products           | .....Natural gas industry          |
| .....Aquaculture                     | .....Petroleum industry            |
| .....Digital agriculture             | .....Oil drilling                  |
| .....Fertilizers                     | .....Oil refineries                |
| .....Greenhouses                     | .....Well logging                  |
| .....Irrigation                      | .....Power industry                |
| .....Architecture                    | .....Electrical equipment industry |
| .....Beverage industry               | .....Electricity supply industry   |
| .....Chemical industry               | .....Nuclear facility regulation   |
| .....Coal industry                   | .....Power system interconnection  |
| .....Communication industry          | .....Steel industry                |
| .....Computer industry               | .....Sugar industry                |
| .....Construction                    | .....Sugar refining                |
| .....Buildings                       | .....Textile technology            |
| .....Green buildings                 | .....Spinning                      |
| .....Modular construction            | .....Weaving                       |
| .....Prefabricated construction      | .....Tourism industry              |
| .....Stairs                          | .....Toy industry                  |
| .....Construction industry           | .....Transportation industry       |
| .....Prefabricated construction      | .....Wood industry                 |
| .....Defense industry                | ...Inspection                      |
| .....Electrical engineering industry | .....Automatic optical inspection  |
| .....Entertainment industry          | ...Machinery                       |
| .....Sports                          | .....Agricultural machinery        |
| .....Financial industry              | .....Agricultural robots           |
| .....Banking                         | .....Ball bearings                 |
| .....Financial services              | .....Belts                         |
| .....Gas industry                    | .....Drives                        |
| .....Information industry            | .....Hydraulic drives              |
| .....Manufacturing industries        | .....Motor drives                  |
| .....Aerospace industry              | .....Variable speed drives         |
| .....Cement industry                 | .....Electric machines             |
| .....Ceramics industry               | .....AC machines                   |
| .....Clothing industry               | .....Alternators                   |
| .....Electrical products industry    | .....Brushless machines            |
| .....Electronics industry            | .....Compressors                   |
| .....Food industry                   | .....Conductors                    |
| .....Footwear industry               | .....DC machines                   |
| .....Fuel processing industries      | .....Electric fences               |
| .....Glass industry                  | .....Generators                    |
| .....Machinery production industries | .....Permanent magnet machines     |
| .....Metal product industries        | .....Rotating machines             |
| .....Plastics industry               | .....Rotors                        |
| .....Pulp and paper industry         | .....Stators                       |
| .....Rubber industry                 | .....Washing machines              |
| .....Shipbuilding industry           | .....Fans                          |
| .....Textile industry                | .....Furnaces                      |
| .....Toy manufacturing industry      | .....Blast furnaces                |
| .....Metals industry                 | .....Kilns                         |
| .....Mining industry                 | .....Gears                         |



|                              |  |
|------------------------------|--|
| .....Magnetic gears          | .....Fabrication                       |
| .....Hydraulic systems       | .....Bonding processes                 |
| .....Electrohydraulics       | .....Microfabrication                  |
| .....Hydraulic equipment     | .....Optical device fabrication        |
| .....Hydraulic fluids        | .....Soldering                         |
| .....Machine components      | .....Welding                           |
| .....Air cleaners            | .....Green manufacturing               |
| .....Belts                   | .....Lithography                       |
| .....Cams                    | .....Colloidal lithography             |
| .....Engine cylinders        | .....Extreme ultraviolet lithography   |
| .....Exhaust systems         | .....Interferometric lithography       |
| .....Impellers               | .....Nanolithography                   |
| .....Intake systems          | .....Soft lithography                  |
| .....Manifolds               | .....Stereolithography                 |
| .....Mechanical splines      | .....X-ray lithography                 |
| .....Pistons                 | .....Manufactured products             |
| .....Rotors                  | .....Ceramic products                  |
| .....Shafts                  | .....Chemical products                 |
| .....Valves                  | .....Consumer products                 |
| .....Motors                  | .....Electrical products               |
| .....AC motors               | .....Food products                     |
| .....Brushless motors        | .....Fuels                             |
| .....Commutation             | .....Glass products                    |
| .....DC motors               | .....Mechanical products               |
| .....Electric motors         | .....Metal products                    |
| .....Hysteresis motors       | .....Paper products                    |
| .....Induction motors        | .....Paper pulp                        |
| .....Micromotors             | .....Plastic products                  |
| .....Permanent magnet motors | .....Rubber products                   |
| .....Servomotors             | .....Sports equipment                  |
| .....Traction motors         | .....Textile products                  |
| .....Universal motors        | .....Tools                             |
| .....Printing machinery      | .....Windows                           |
| .....Pumps                   | .....Manufacturing systems             |
| .....Fuel pumps              | .....Agile manufacturing               |
| .....Heat pumps              | .....Automobile manufacture            |
| .....Insulin pumps           | .....Batch production systems          |
| .....Micropumps              | .....Blanking                          |
| .....Water pumps             | .....Cellular manufacturing            |
| .....Textile machinery       | .....Flow production systems           |
| .....Spinning machines       | .....Food manufacturing                |
| .....Manufacturing           | .....Forging                           |
| .....Assembly                | .....Glass manufacturing               |
| .....Fitting                 | .....Integrated manufacturing systems  |
| .....Microassembly           | .....Intelligent manufacturing systems |
| .....Preforms                | .....Job production systems            |
| .....Soldering               | .....Joining processes                 |
| .....Assembly systems        | .....Layered manufacturing             |
| .....Flexible electronics    | .....Lean production                   |
| .....Robotic assembly        | .....Manufacturing processes           |
| .....Embossing               | .....Mass production                   |



|                                  |                                      |
|----------------------------------|--------------------------------------|
| .....Melt processing             | .....Softening                       |
| .....Pulp manufacturing          | .....Swaging                         |
| .....Sheet metal processing      | .....Mechanical products             |
| .....Thermoforming               | .....Automotive components           |
| .....Three-dimensional printing  | .....Axles                           |
| .....Mass customization          | .....Bellows                         |
| .....Smart manufacturing         | .....Blades                          |
| .....Tolerance analysis          | .....Brakes                          |
| ....Packaging                    | .....Couplings                       |
| .....Bagging                     | .....Fasteners                       |
| .....Bottling                    | .....Flanges                         |
| .....Canning                     | .....Gears                           |
| .....Encapsulation               | .....Hoses                           |
| .....Food packaging              | .....Machine components              |
| .....Labeling                    | .....Mechanical guides               |
| .....Multichip modules           | .....Needles                         |
| .....Nanopackaging               | .....Orifices                        |
| .....Plastic packaging           | .....Pistons                         |
| .....Wrapping                    | .....Pressure vessels                |
| ...Paper technology              | .....Seals                           |
| ...Production                    | .....Springs                         |
| .....Ball milling                | .....Steering systems                |
| .....Compression molding         | .....Structural shapes               |
| .....Embossing                   | .....Tires                           |
| .....Food products               | .....Vents                           |
| .....Dairy products              | .....Wheels                          |
| .....Fats                        | .....Process planning                |
| .....Food waste                  | .....Business process integration    |
| .....Sugar                       | .....Business process management     |
| .....Group technology            | .....Cause effect analysis           |
| .....Injection molding           | .....Root cause analysis             |
| .....Materials processing        | .....Production control              |
| .....Annealing                   | .....Continuous production           |
| .....Bleaching                   | .....Lot sizing                      |
| .....Casting                     | .....Optimized production technology |
| .....Coatings                    | .....Scheduling                      |
| .....Curing                      | .....Production engineering          |
| .....Etching                     | .....Production planning             |
| .....Heat treatment              | .....Production equipment            |
| .....Joining processes           | .....Applicators                     |
| .....Lamination                  | .....Clamps                          |
| .....Laser materials processing  | .....Cutting tools                   |
| .....Machining                   | .....Fixtures                        |
| .....Melt processing             | .....Machine tools                   |
| .....Plasma materials processing | .....Mining equipment                |
| .....Plating                     | .....Molding equipment               |
| .....Pressing                    | .....Packaging machines              |
| .....Punching                    | .....Paper making machines           |
| .....Refining                    | .....Polishing machines              |
| .....Shearing                    | .....Soldering equipment             |
| .....Smelting                    | .....Production facilities           |



- .....Foundries
- .....Greenhouses
- .....Industrial facilities
- .....Industrial plants
- .....Machine shops
- .....Paper mills
- .....Production management
- .....Control charts
- .....Inventory management
- .....Lead time reduction
- .....Logistics
- .....Process planning
- .....Production planning
- .....Production materials
- .....Abrasives
- .....Aerospace materials
- .....Automotive materials
- .....Inhibitors
- .....Ink
- .....Joining materials
- .....Lubricants
- .....Retardants
- .....Production systems
- .....Assembly systems
- .....Exhaust systems
- .....Intelligent manufacturing systems
- .....Lean production
- .....Manufacturing systems
- .....Steering systems
- .....Productivity
- .....Shafts
- .....Camshafts
- .....Springs
- .....Transfer molding
- ....Safety
- .....Aerospace safety
- .....Air safety
- .....Domestic safety
- .....Fall detection
- .....Emergency services
- .....Explosion protection
- .....Fire safety
- .....Hazards
- .....Biohazards
- .....Chemical hazards
- .....Explosions
- .....Fires
- .....Flammability
- .....Floods
- .....Hazardous areas
- .....Hazardous materials
- .....Toxicology
- .....Health and safety
- .....Occupational health
- .....Occupational safety
- .....Personal protective equipment
- .....Marine safety
- .....Product safety
- .....Protection
- .....Explosion protection
- .....Lightning protection
- .....Radiation protection
- .....Radiation safety
- .....Radiation protection
- .....Safety devices
- .....Eye protection
- .....Fire extinguishers
- .....Protective clothing
- .....Safety management
- .....Vehicle safety
- .....Advanced driver assistance systems
- .....Lane departure warning systems
- .....Lane detection
- ....Security
- .....Access control
- .....Authorization
- .....Blacklisting
- .....Multi-factor authentication
- .....Password
- .....Alarm systems
- .....Smoke detectors
- .....Capability-based security
- .....Computer security
- .....Application security
- .....Authentication
- .....Cloud computing security
- .....Computer crime
- .....Computer hacking
- .....Countermeasures (computer)
- .....Cross-site scripting
- .....Cyber espionage
- .....Cyber warfare
- .....Cyberattack
- .....Data integrity
- .....Denial-of-service attack
- .....Firewalls (computing)
- .....Honey pot (computing)
- .....Identity management systems
- .....Internet security
- .....Mobile security
- .....Password



- .....Penetration testing
- .....Permission
- .....Phishing
- .....Proof of Work
- .....Trusted computing
- .....Control system security
- .....Physical unclonable function
- .....Cryptography
- .....Ciphers
- .....Cryptocurrency
- .....Cryptographic hash function
- .....Encryption
- .....Public key
- .....Quantum cryptography
- .....Random number generation
- .....Side-channel attacks
- .....Zero knowledge proof
- .....Data security
- .....Cryptography
- .....Message authentication
- .....Tokenization
- .....Digital signatures
- .....Information security
- .....Cyber espionage
- .....Data breach
- .....Intrusion detection
- .....Phishing
- .....Privacy breach
- .....Social engineering (security)
- .....SQL injection
- .....Trust management
- .....Network security
- .....Network reconnaissance
- .....Power system security
- .....Reconnaissance
- .....Security management
- .....Terrorism
- .....Bioterrorism
- .....Cyber terrorism
- .....National security
- .....Watermarking
- ....Wine industry
- .....Wineries
- Information theory**
- ....Audio coding
- ....Biological information theory
- ....Channel coding
- .....Block codes
- .....Linear codes
- .....Polar codes
- .....Combined source-channel coding
- .....Turbo codes
- ....Codes
- .....Binary codes
- .....Reflective binary codes
- .....Convolutional codes
- .....Cyclic redundancy check codes
- .....Error correction codes
- .....Reed-Muller codes
- .....Reed-Solomon codes
- .....Parity check codes
- .....Iterative decoding
- .....Product codes
- .....Bar codes
- .....Space-time codes
- .....Zero correlation zone
- ....Communication channels
- .....Channel allocation
- .....Spectral efficiency
- .....Channel capacity
- .....Channel estimation
- .....Channel models
- .....Channel spacing
- .....Channel state information
- .....Gaussian channels
- .....AWGN channels
- .....Multipath channels
- .....Multiuser channels
- .....Partial response channels
- .....Quantum channel
- .....Throughput
- .....Time-varying channels
- ....Decoding
- .....Maximum likelihood decoding
- ....Encoding
- .....Audio coding
- .....Channel coding
- .....Block codes
- .....Combined source-channel coding
- .....Turbo codes
- .....Code refractoring
- .....Digital representation
- .....Entropy coding
- .....Huffman coding
- .....Precoding
- .....Source coding
- .....Speech coding
- .....Transcoding
- ....Error compensation
- ....Genetic communication



- ....Hamming distance
- ....Hamming weight
- ....Information entropy
- ....Mutual information
- ....Network coding
- ....Rate distortion theory
  - .....Channel rate control
- ....Rate-distortion
- ....Source coding
- ....Speech coding
- ....Technology acceptance model

**Instrumentation and measurement**

- ....Computerized instrumentation
- ....Electric variables
  - .....Admittance
  - .....Capacitance
    - .....Parasitic capacitance
    - .....Quantum capacitance
  - .....Capacitance-voltage characteristics
  - .....Conductivity
    - .....Photoconductivity
    - .....Semiconductivity
    - .....Transconductance
  - .....Current
    - .....Bioimpedance
    - .....Current slump
    - .....Dark current
    - .....Fault currents
    - .....Leakage currents
    - .....Persistent currents
    - .....Short-circuit currents
    - .....Threshold current
  - .....Current-voltage characteristics
  - .....Electric potential
  - .....Gain
  - .....Impedance
    - .....Impedance matching
      - .....Baluns
  - .....Inductance
  - .....Permittivity
  - .....Piezoresistance
  - .....Q-factor
  - .....Resistance
    - .....Electric resistance
    - .....Piezoresistance
    - .....Surface resistance
    - .....Thermal resistance
  - .....Viscosity
  - .....Voltage

- .....Breakdown voltage
- .....Dynamic voltage scaling
- .....Threshold voltage
- .....Voltage fluctuations
- .....Wiring
- ....High energy physics instrumentation computing
  - .....Linear particle accelerator
- ....Instruments
  - .....Compass
  - .....Medical instruments
  - .....Meters
    - .....Dynamometers
    - .....Flowmeters
    - .....Goniometers
    - .....Potentiometers
    - .....Radiometers
    - .....Tachometers
    - .....Vibrometers
    - .....Voltmeters
    - .....Watt-hour meters
    - .....Wattmeters
  - .....Microscopy
    - .....Atomic force microscopy
    - .....Electron microscopy
    - .....Endomicroscopy
    - .....Scanning microwave microscopy
    - .....Scanning probe microscopy
  - .....Network analyzers
  - .....Oscilloscopes
  - .....Pressure gauges
  - .....Probes
  - .....Telescopes
  - .....Theodolites
  - .....Tuners
- ....Measurement
  - .....Accelerometers
  - .....Acoustic measurements
  - .....Antenna measurements
  - .....Anthropometry
  - .....Area measurement
  - .....Atmospheric measurements
  - .....Atomic measurements
  - .....Bathymetry
  - .....Biomedical measurement
    - .....Biomarkers
    - .....Biomedical monitoring
    - .....Electroencephalography
    - .....Electromyography
    - .....Electrooculography
    - .....Electrophysiology



|  |                                       |
|--|---------------------------------------|
| .....Photoplethysmography              | .....Gas chromatography               |
| .....Plethysmography                   | .....Geologic measurements            |
| .....Pulse oximeter                    | .....Geophysical measurements         |
| .....Reproducibility of results        | .....Geodesy                          |
| .....Sensitivity and specificity       | .....Sea measurements                 |
| .....Calorimetry                       | .....Seismic measurements             |
| .....Coordinate measuring machines     | .....Interferometry                   |
| .....Density measurement               | .....Fabry-Perot                      |
| .....Hydrometers                       | .....Interferometers                  |
| .....Distance measurement              | .....Optical interferometry           |
| .....Euclidean distance                | .....Phase shifting interferometry    |
| .....Distortion measurement            | .....Radar interferometry             |
| .....Total harmonic distortion         | .....Radio interferometry             |
| .....Doppler measurement               | .....Sagnac interferometers           |
| .....Dosimetry                         | .....Key performance indicator        |
| .....Dynamic range                     | .....Length measurement               |
| .....Electric variables measurement    | .....Lifetime estimation              |
| .....Admittance measurement            | .....Loss measurement                 |
| .....Ammeters                          | .....Packet loss                      |
| .....Attenuation measurement           | .....Magnetic variables measurement   |
| .....Capacitance measurement           | .....Magnetic anomaly detection       |
| .....Conductivity measurement          | .....Magnetic field measurement       |
| .....Current measurement               | .....Magnetometers                    |
| .....Dielectric measurement            | .....Permeability measurement         |
| .....Electrical resistance measurement | .....Measurement by laser beam        |
| .....Electrostatic measurements        | .....Laser velocimetry                |
| .....Energy measurement                | .....Measurement errors               |
| .....Impedance measurement             | .....Measurement techniques           |
| .....Inductance measurement            | .....Calibration                      |
| .....Partial discharge measurement     | .....Dynamic equilibrium              |
| .....Phasor measurement units          | .....Measurement uncertainty          |
| .....Power measurement                 | .....Measurement units                |
| .....Q measurement                     | .....International System of Units    |
| .....Rydberg atoms                     | .....Nanometers                       |
| .....Transmission line measurements    | .....Mechanical variables measurement |
| .....Voltage measurement               | .....Angular velocity                 |
| .....Electromagnetic measurements      | .....Displacement measurement         |
| .....Electromagnetic modeling          | .....Force measurement                |
| .....Linearity                         | .....Motion measurement               |
| .....Microwave measurement             | .....Position measurement             |
| .....Millimeter wave measurements      | .....Rotation measurement             |
| .....Parameter extraction              | .....Strain measurement               |
| .....Polarimetry                       | .....Stress measurement               |
| .....Radiometry                        | .....Thickness measurement            |
| .....Submillimeter wave measurements   | .....Torque measurement               |
| .....Extraterrestrial measurements     | .....Velocity measurement             |
| .....Fluid flow measurement            | .....Vibration measurement            |
| .....Frequency measurement             | .....Volume measurement               |
| .....Frequency estimation              | .....Weight measurement               |
| .....Frequency-domain analysis         | .....Micrometers                      |
| .....Gain measurement                  | .....Moisture measurement             |





|   |  |
|---|--|
| .....Humidity measurement                         | .....Resonance light scattering        |
| .....Noise measurement                            | .....Thermal variables measurement     |
| .....Multiple signal classification               | .....Temperature measurement           |
| .....Noise figure                                 | .....Time measurement                  |
| .....Noise shaping                                | .....Clocks                            |
| .....Nuclear measurements                         | .....Time dissemination                |
| .....Particle tracking                            | .....Timing                            |
| .....Optical variables measurement                | .....UHF measurements                  |
| .....Ellipsometry                                 | .....Ultrasonic variables measurement  |
| .....Photometry                                   | .....Viscosity                         |
| .....Reflection coefficient                       | .....Wavelength measurement            |
| .....Refractive index                             | .....Wide area measurements            |
| .....Particle beam measurements                   | ...Monitoring                          |
| .....Particle measurements                        | .....Computerized monitoring           |
| .....Performance evaluation                       | .....Environmental monitoring          |
| .....Key performance indicator                    | .....Patient monitoring                |
| .....pH measurement                               | .....Process monitoring                |
| .....Phase measurement                            | .....Radiation monitoring              |
| .....Plasma measurements                          | .....Radiation dosage                  |
| .....Pollution measurement                        | .....Remote monitoring                 |
| .....Pressure measurement                         | .....Surveillance                      |
| .....Altimetry                                    | .....Infrared surveillance             |
| .....Tire pressure                                | .....Video surveillance                |
| .....Pulse measurements                           | .....Water monitoring                  |
| .....Reflectometry                                | ...Pulse oximetry                      |
| .....Reproducibility of results                   | ...Testing                             |
| .....Scintillation counters                       | .....Aerospace testing                 |
| .....Solid scintillation detectors                | .....Wind tunnels                      |
| .....Sea state                                    | .....Automatic testing                 |
| .....Semiconductor device measurement             | .....Automatic test pattern generation |
| .....Sensitivity                                  | .....Ring generators                   |
| .....Sensitivity analysis                         | .....Benchmark testing                 |
| .....Shape measurement                            | .....Built-in self-test                |
| .....Size measurement                             | .....Circuit testing                   |
| .....Functional point analysis                    | .....Integrated circuit measurements   |
| .....Software measurement                         | .....Conformance testing               |
| .....Soil measurements                            | .....Electronic equipment testing      |
| .....Salinity (geophysical)                       | .....Immunity testing                  |
| .....Spectral efficiency                          | .....Error analysis                    |
| .....Spectroscopy                                 | .....Bit error rate                    |
| .....Deep level transient spectroscopy            | .....Finite wordlength effects         |
| .....Electrochemical impedance spectroscopy       | .....Error-free operations             |
| .....Electron paramagnetic resonance spectroscopy | .....Failure analysis                  |
| .....Fourier transform infrared spectroscopy      | .....Equipment failure                 |
| .....Kirchhoff's Law                              | .....Semiconductor device breakdown    |
| .....Mass spectroscopy                            | .....Frequency response                |
| .....MERIS  | .....Impulse testing                   |
| .....Neutron spin echo                            | .....Insulator testing                 |
| .....Photoacoustic effects                        | .....Insulation testing                |
|   | .....Integrated circuit testing        |
|   | .....Integrated circuit yield          |





- .....Logic testing
- .....Life testing
- .....Materials testing
- .....Accelerated aging
- .....Acoustic testing
- .....Adhesive strength
- .....Bonding forces
- .....Delamination
- .....Elastic recovery
- .....Nondestructive testing
- .....Optical fiber testing
- .....Remaining life assessment
- .....Ring generators
- .....Semiconductor device testing
- .....Software testing
- .....Combinatorial testing
- .....Fuzzing
- .....System testing
- .....Model checking
- .....Test equipment
- .....Automatic test equipment
- .....Test facilities
- .....Anechoic chambers
- .....Laboratories
- .....Large Hadron Collider
- .....Open area test sites
- .....TEM cells
- .....Wind tunnels

### **Intelligent transportation systems**

- ....Automated highways
- ....Autonomous automobiles
- ....Geographic information systems
  - .....Geospatial analysis
  - .....Gunshot detection systems
- ....Intelligent vehicles
  - .....Autonomous vehicles
    - .....Unmanned autonomous vehicles
    - .....Unmanned vehicles
      - .....Unmanned aerial vehicles
      - .....Unmanned underwater vehicles
  - .....Vehicle-to-everything
    - .....Vehicle-to-infrastructure
- ....Navigation
  - .....Aircraft navigation
  - .....Course correction
  - .....Dead reckoning
  - .....Indoor navigation
  - .....Inertial navigation
  - .....Marine navigation

- .....Radio navigation
- .....Satellite navigation systems
  - .....Global navigation satellite system
  - .....Global Positioning System
  - .....Satellite constellations
- .....Sonar navigation
- ....Transportation
  - .....Air transportation
    - .....Aircraft
    - .....Airports
  - .....Escalators
  - .....Green transportation
  - .....Land transportation
    - .....Rail transportation
    - .....Road transportation
  - .....Public transportation
  - .....Seaports
  - .....Smart transportation
  - .....Vehicles
    - .....Connected vehicles
    - .....Hydrogen powered vehicles
    - .....Intelligent vehicles
    - .....Land vehicles
    - .....Military vehicles
    - .....Space vehicles

### **Lasers and electrooptics**

- ....Electrooptic effects
  - .....Electrochromism
  - .....Kerr effect
  - .....Optical bistability
  - .....Stark effect
- ....Electro-optical devices
  - .....Electrochromic devices
  - .....Electrooptic deflectors
  - .....Electrooptic modulators
- ....Lasers
  - .....Atom lasers
  - .....Chemical lasers
    - .....Chemical oxygen iodine lasers
  - .....Diode lasers
  - .....Free electron lasers
  - .....Gas lasers
  - .....Laser applications
    - .....Dark states
    - .....Distributed feedback devices
    - .....Laser ablation
    - .....Laser beam cutting
    - .....Laser beam machining
    - .....Laser fusion



|  |                                       |
|--|---------------------------------------|
| .....Laser theory                            | .....Fast light                       |
| .....Magneto-optic recording                 | .....Luminescent devices              |
| .....Laser excitation                        | .....Phosphors                        |
| .....Optical pumping                         | .....Slow light                       |
| .....Laser modes                             | .....Stray light                      |
| .....Laser mode locking                      | .....Superluminescent diodes          |
| .....Laser stability                         | .....Ultraviolet sources              |
| .....Laser transitions                       | .....Luminescence                     |
| .....Power lasers                            | .....Bioluminescence                  |
| .....Pump lasers                             | .....Electroluminescence              |
| .....Quantum well lasers                     | .....Fluorescence                     |
| .....Quantum cascade lasers                  | .....Phosphorescence                  |
| .....Ring lasers                             | .....Photoluminescence                |
| .....Fiber lasers                            | .....Thermoluminescence               |
| .....Semiconductor lasers                    | .....Microoptics                      |
| .....Laser tuning                            | .....Micromirrors                     |
| .....Quantum dot lasers                      | .....Nonlinear optics                 |
| .....Quantum well lasers                     | .....Fiber nonlinear optics           |
| .....Semiconductor laser arrays              | .....Nonlinear optical devices        |
| .....Semiconductor optical amplifiers        | .....Optical mixing                   |
| .....Surface emitting lasers                 | .....Optical saturation               |
| .....Solid lasers                            | .....Photorefractive effect           |
| .....Microchip lasers                        | .....Raman scattering                 |
| .....Quantum well lasers                     | .....Supercontinuum generation        |
| .....Semiconductor lasers                    | .....Optical amplifiers               |
| .....Surface emitting lasers                 | .....Doped fiber amplifiers           |
| .....Surface emitting lasers                 | .....Erbium-doped fiber amplifiers    |
| .....Vertical cavity surface emitting lasers | .....Semiconductor optical amplifiers |
| .....X-ray lasers                            | .....Optical crosstalk                |
| .....Optics                                  | .....Optical design                   |
| .....Adaptive optics                         | .....Optical design techniques        |
| .....Birefringence                           | .....Optical devices                  |
| .....Brightness                              | .....Bragg gratings                   |
| .....Brightness temperature                  | .....Collimators                      |
| .....Color                                   | .....Displays                         |
| .....Pigmentation                            | .....Holographic optical components   |
| .....Electron optics                         | .....Lenses                           |
| .....Extinction coefficients                 | .....Light deflectors                 |
| .....Extinction ratio                        | .....Lighting                         |
| .....Fiber optics                            | .....Luminescent devices              |
| .....Fiber nonlinear optics                  | .....Mirrors                          |
| .....Optical fibers                          | .....Optical arrays                   |
| .....Fluorescence                            | .....Optical attenuators              |
| .....Four-wave mixing                        | .....Optical collimators              |
| .....Geometrical optics                      | .....Optical device fabrication       |
| .....Ray tracing                             | .....Optical filters                  |
| .....Integrated optics                       | .....Optical resonators               |
| .....Light fields                            | .....Optical sensors                  |
| .....Light sources                           | .....Thermo-optical devices           |
| .....Electroluminescent devices              | .....Optical distortion               |
|  | .....Optical engineering              |



- .....Optical fiber applications
- .....Optical fiber devices
- .....Optical harmonic generation
- .....Optical losses
- .....Optical microscopy
- .....Optical mixing
- .....Multiwave mixing
- .....Optical polarization
- .....Polarization shift keying
- .....Stokes parameters
- .....Optical pulses
- .....Optical retarders
- .....Optical saturation
- .....Optical solitons
- .....Optical tuning
- .....Particle beam optics
- .....Atom optics
- .....Electron optics
- .....Stimulated emission
- .....Photoluminescence
- .....Physical optics
- .....Optical refraction
- .....Optical vortices
- .....Ray tracing
- .....Stray light
- .....Ultrafast optics
- .....Whispering gallery modes
- ....Optoelectronic devices
- .....Charge-coupled image sensors
- .....Integrated optoelectronics
- .....Light emitting diodes
- .....Inorganic light emitting diodes
- .....LED lamps
- .....Organic light emitting diodes
- .....Superluminescent diodes
- .....Photoconducting devices
- .....Electrophotography
- .....Photodetectors
- .....Photodiodes
- .....Phototransistors
- .....Superconducting photodetectors
- .....Superluminescent diodes
- ....Photonics
- .....Biophotonics
- .....Microwave photonics
- .....Nanobiophotonics
- .....Nanophotonics
- .....Photochromism
- .....Photothermal effects
- .....Silicon photonics
- .....Spontaneous emission

- .....Radiative recombination

## Magnetics

- ....Biomagnetics
- .....Magnetoencephalography
- ....Demagnetization
- ....Gyromagnetism
- ....Magnetic analysis
- .....Magnetization
- ....Magnetic anisotropy
- .....Magnetic domain walls
- .....Magnetic domains
- .....Magnetic moments
- .....Perpendicular magnetic anisotropy
- ....Magnetic devices
- .....Accelerator magnets
- .....Ferrite devices
- .....Circulators
- .....Magnetic cores
- .....Transformer cores
- .....Magnetic gears
- .....Magnetic heads
- .....Magnetic memory
- .....Floppy disks
- .....Hard disks
- .....Magnetic modulators
- .....Magneto-optic devices
- .....Magnetoresistive devices
- .....Magnetostrictive devices
- .....Solenoids
- .....Transformer cores
- .....Undulators
- ....Magnetic fields
- .....Geomagnetism
- .....Magnetic reconnection
- .....Magnetic separation
- .....Magnetostatics
- .....Toroidal magnetic fields
- ....Magnetic flux
- .....Flux pinning
- .....Magnetic flux density
- .....Magnetic flux leakage
- ....Magnetic force microscopy
- ....Magnetic forces
- .....Coercive force
- ....Magnetic hysteresis
- ....Magnetic levitation
- .....Magnetic levitation vehicles
- ....Magnetic losses
- ....Magnetic materials



- .....Amorphous magnetic materials
- .....Antiferromagnetic materials
- .....Diamagnetic materials
- .....Ferrimagnetic films
  - .....Ferrite films
  - .....Garnet films
- .....Ferrimagnetic materials
  - .....Ferrimagnetic films
  - .....Ferrite films
  - .....Ferrites
  - .....Garnet films
  - .....Garnets
- .....Ferrite films
- .....Ferrites
- .....Ferrite films
- .....Ferrofluid
- .....Ferromagnetic materials
  - .....Garnet films
  - .....Garnets
  - .....Garnet films
- .....Magnetic films
  - .....Ferrimagnetic films
  - .....Ferrite films
  - .....Garnet films
- .....Magnetic liquids
- .....Magnetic semiconductors
- .....Magnetic superlattices
- .....Paramagnetic materials
- .....Soft magnetic materials
- ...Magnetic multilayers
- ...Magnetic particles
- ...Magnetic properties
- ...Magnetic sensors
- .....Spin valves
- ...Magnetic susceptibility
- ...Magnetic switching
- ...Magnetization processes
  - .....Magnetization reversal
  - .....Saturation magnetization
- ...Magnetoacoustic effects
- ...Magnetolectric effects
- .....Hall effect
- .....Magnetic tunneling
- .....Magnetoelectronics
  - .....Spin polarized transport
- .....Magnetoresistance
  - .....Anisotropic magnetoresistance
  - .....Ballistic magnetoresistance
  - .....Colossal magnetoresistance
  - .....Enhanced magnetoresistance
  - .....Extraordinary magnetoresistance

- .....Giant magnetoresistance
- .....Ordinary magnetoresistance
- .....Tunneling magnetoresistance
- .....Spintronics
- ...Magnetomechanical effects
- .....Magnetic field induced strain
- .....Magnetoelasticity
- .....Magnetostriction
- .....Magnetostriction
- ...Magneto optic effects
- .....Faraday effect
- .....Gyrotropism
- ...Magnets
  - .....Electromagnets
  - .....Superconducting magnets
- .....Micromagnetics
- .....Permanent magnets
- ...Magnonics
- ...Microwave magnetics
- ...Nonlinear magnetics
- ...Remanence

**Materials, elements, and compounds**

- ...Chemical elements
  - .....Actinium
  - .....Aluminum
  - .....Aluminum alloys
  - .....Aluminum compounds
  - .....Americium
  - .....Antimony
  - .....Arsenic
  - .....Arsenic compounds
  - .....Astatine
  - .....Berkelium
  - .....Beryllium
  - .....Boron
  - .....Boron alloys
  - .....Bromine
  - .....Bromine compounds
  - .....Californium
  - .....Carbon
  - .....Carbon nanotubes
  - .....Diamond
  - .....Fullerenes
  - .....Graphene
  - .....Graphite
  - .....Cerium
  - .....Cesium
  - .....Chlorine
  - .....Chlorine compounds



|                           |                                 |
|---------------------------|---------------------------------|
| .....Curium               | .....Technetium                 |
| .....Darmstadtium         | .....Tellurium                  |
| .....Dysprosium           | .....Terbium                    |
| .....Dysprosium compounds | .....Thallium                   |
| .....Europium             | .....Thorium                    |
| .....Fluorine             | .....Thulium                    |
| .....Fluorine compounds   | .....Titanium                   |
| .....Francium             | .....Titanium alloys            |
| .....Gadolinium           | .....Titanium compounds         |
| .....Gadolinium oxide     | .....Titanium dioxide           |
| .....Hafnium              | .....Titanium nitride           |
| .....Hafnium compounds    | .....Uranium                    |
| .....Helium               | .....Vanadium                   |
| .....Holmium              | .....Ytterbium                  |
| .....Hydrogen             | .....Yttrium                    |
| .....Deuterium            | .....Yttrium compounds          |
| .....Iodine               | .....Zirconium                  |
| .....Iodine compounds     | ...Compounds                    |
| .....Iridium              | .....Bismuth compounds          |
| .....Isotopes             | .....Gallium compounds          |
| .....Krypton              | .....Aluminum gallium nitride   |
| .....Lutetium             | .....Gallium arsenide           |
| .....Mercury (metals)     | .....Gallium nitride            |
| .....Molybdenum           | .....Indium gallium arsenide    |
| .....Neon                 | .....Indium gallium nitride     |
| .....Neptunium            | .....Indium compounds           |
| .....Nitrogen             | .....Indium gallium arsenide    |
| .....Nitrogen compounds   | .....Indium tin oxide           |
| .....Silicon nitride      | .....Inorganic compounds        |
| .....Osmium               | .....Lead compounds             |
| .....Oxygen               | .....Organic compounds          |
| .....Phosphorus           | .....Carbon compounds           |
| .....Plutonium            | .....Organic semiconductors     |
| .....Polonium             | .....Volatile organic compounds |
| .....Potassium            | .....Silicon compounds          |
| .....Praseodymium         | .....Silicides                  |
| .....Promethium           | .....Silicon carbide            |
| .....Protactinium         | .....Silicon nitride            |
| .....Radium               | ...Material storage             |
| .....Radon                | .....Bulk storage               |
| .....Rhenium              | .....Containers                 |
| .....Rhodium              | .....Freight containers         |
| .....Roentgenium          | .....Fuel storage               |
| .....Rubidium             | .....Secure storage             |
| .....Ruthenium            | .....Stacking                   |
| .....Scandium             | .....Storage automation         |
| .....Selenium             | .....Warehousing                |
| .....Sodium               | .....Water storage              |
| .....Sulfur               | .....Dams                       |
| .....Sulfur compounds     | .....Reservoirs                 |
| .....Tantalum             | ...Materials                    |



|                                  |                                   |
|----------------------------------|-----------------------------------|
| .....Acoustic materials          | .....Conductive films             |
| .....Additives                   | .....Dielectric films             |
| .....Aggregates                  | .....Epitaxial layers             |
| .....Amorphous materials         | .....Ferrimagnetic films          |
| .....Diamond-like carbon         | .....Ferrite films                |
| .....Glass                       | .....Garnet films                 |
| .....Auxetic materials           | .....Magnetic films               |
| .....Biological materials        | .....Optical films                |
| .....Bioceramics                 | .....Piezoelectric films          |
| .....Biomedical materials        | .....Plastic films                |
| .....Bioceramics                 | .....Polymer films                |
| .....Biomembranes                | .....Semiconductor films          |
| .....Building materials          | .....Thick films                  |
| .....Asphalt                     | .....Thin films                   |
| .....Concrete                    | .....Fluids                       |
| .....Floors                      | .....Ferrofluid                   |
| .....Mortar                      | .....Fluid dynamics               |
| .....Tiles                       | .....Gases                        |
| .....Windows                     | .....Hydraulic fluids             |
| .....Catalysts                   | .....Liquids                      |
| .....Electrocatalysts            | .....Viscosity                    |
| .....Photocatalysts              | .....Hazardous materials          |
| .....Ceramics                    | .....Inorganic materials          |
| .....Bioceramics                 | .....Lacquers                     |
| .....Porcelain                   | .....Laminates                    |
| .....Composite materials         | .....Magnetic materials           |
| .....Cermet                      | .....Amorphous magnetic materials |
| .....Conducting materials        | .....Antiferromagnetic materials  |
| .....Electrolytes                | .....Diamagnetic materials        |
| .....Corrosion inhibitors        | .....Ferrimagnetic films          |
| .....Crystalline materials       | .....Ferrimagnetic materials      |
| .....Martensite                  | .....Ferrite films                |
| .....Nanocrystals                | .....Ferrites                     |
| .....Perovskites                 | .....Ferrofluid                   |
| .....Superlattices               | .....Ferromagnetic materials      |
| .....Crystals                    | .....Garnet films                 |
| .....Colloidal crystals          | .....Garnets                      |
| .....Crystal microstructure      | .....Magnetic films               |
| .....Crystallography             | .....Magnetic liquids             |
| .....Grain boundaries            | .....Magnetic semiconductors      |
| .....Grain size                  | .....Magnetic superlattices       |
| .....Liquid crystals             | .....Paramagnetic materials       |
| .....Quartz crystals             | .....Soft magnetic materials      |
| .....Dielectric materials        | .....Material properties          |
| .....Dielectric films            | .....Creep                        |
| .....Dielectric liquids          | .....Elasticity                   |
| .....Electrets                   | .....Elongation                   |
| .....Epoxy resins                | .....Resilience                   |
| .....High-k dielectric materials | .....Rigidity                     |
| .....Piezoelectric materials     | .....Media                        |
| .....Films                       | .....Nonhomogeneous media         |



|   |  |
|---|--|
| .....Photorealism                       | .....Lubricants                        |
| .....Random media                       | .....Retardants                        |
| .....Mesoporous materials               | .....Radioactive materials             |
| .....Metal foam                         | .....Nuclear fuels                     |
| .....Metallic materials                 | .....Radioactive decay                 |
| .....Metamaterials                      | .....Radioactive waste                 |
| .....Electromagnetic metamaterials      | .....Raw materials                     |
| .....Optical cloaking                   | .....Resins                            |
| .....Optical metamaterials              | .....Epoxy resins                      |
| .....Nanostructured materials           | .....Resists                           |
| .....Nanocomposites                     | .....Semiconductor materials           |
| .....Nanoporous materials               | .....Amorphous semiconductors          |
| .....Oils                               | .....Deep level transient spectroscopy |
| .....Lubricating oils                   | .....Elemental semiconductors          |
| .....Vegetable oils                     | .....Gallium                           |
| .....Optical materials                  | .....Gallium arsenide                  |
| .....Colloidal nanocrystals             | .....Germanium                         |
| .....Optical cloaking                   | .....III-V semiconductor materials     |
| .....Optical polymers                   | .....II-VI semiconductor materials     |
| .....Optical retarders                  | .....Indium gallium arsenide           |
| .....Optical superlattices              | .....Indium phosphide                  |
| .....Photorefractive materials          | .....Magnetic semiconductors           |
| .....Organic inorganic hybrid materials | .....Organic semiconductors            |
| .....Organic materials                  | .....Semiconductor superlattices       |
| .....Paints                             | .....Silicon                           |
| .....Paper pulp                         | .....Silicon germanium                 |
| .....Petrochemicals                     | .....Substrates                        |
| .....Phase change materials             | .....Wide band gap semiconductors      |
| .....Photoconducting materials          | .....Sheet materials                   |
| .....Plastics                           | .....Smart materials                   |
| .....Epoxy resins                       | .....Biomimetic materials              |
| .....Fiber reinforced plastics          | .....Smart textiles                    |
| .....Plastic films                      | .....Solids                            |
| .....Plastic optical fiber              | .....Young's modulus                   |
| .....Polymer foams                      | .....Superconducting materials         |
| .....Polymer gels                       | .....Granular superconductors          |
| .....Polymers                           | .....High-temperature superconductors  |
| .....Azobenzene                         | .....Multifilamentary superconductors  |
| .....Biopolymers                        | .....Niobium-tin                       |
| .....Liquid crystal polymers            | .....Type II superconductors           |
| .....Optical polymers                   | .....Surfactants                       |
| .....Polycaprolactone                   | .....Terahertz materials               |
| .....Polyethylene                       | .....Terahertz metamaterials           |
| .....Polyimides                         | .....Textiles                          |
| .....Production materials               | .....Cotton                            |
| .....Abrasives                          | .....Fabrics                           |
| .....Aerospace materials                | .....Textile fibers                    |
| .....Automotive materials               | .....Wool                              |
| .....Inhibitors                         | .....Thermoelectric materials          |
| .....Ink                                | .....Waste materials                   |
| .....Joining materials                  | .....Effluents                         |





|                                     |                           |
|-------------------------------------|---------------------------|
| .....Electronic waste               | .....Photonic crystals    |
| .....Food waste                     | .....Pigmentation         |
| .....Industrial waste               | .....Pigments             |
| .....Radioactive waste              | .....Separation processes |
| .....Slurries                       | .....Fractionation        |
| .....Wastewater                     | .....Particle separators  |
| .....Wire                           | .....Surface engineering  |
| ...Materials science and technology | .....Surfaces             |
| .....Absorption                     | .....Corrosion            |
| .....Aging                          | .....Corrugated surfaces  |
| .....Accelerated aging              | .....Metasurfaces         |
| .....Chemical analysis              | .....Rough surfaces       |
| .....Activation analysis            | .....Surface impedance    |
| .....Chemical processes             | .....Surface morphology   |
| .....Chemicals                      | .....Surface resistance   |
| .....Electronic noses               | .....Surface roughness    |
| .....pH measurement                 | .....Surface soil         |
| .....Contamination                  | .....Surface stress       |
| .....Surface contamination          | .....Surface structures   |
| .....Degradation                    | .....Surface tension      |
| .....Filtration                     | .....Surface texture      |
| .....Microfiltration                | .....Surface topography   |
| .....Hysteresis                     | .....Surface treatment    |
| .....Impurities                     | ...Metals                 |
| .....Semiconductor impurities       | .....Alloying             |
| .....Materials handling             | .....Intermetallic        |
| .....Cleaning                       | .....Shape memory alloys  |
| .....Decontamination                | .....Aluminum             |
| .....Freight handling               | .....Aluminum alloys      |
| .....Materials handling equipment   | .....Aluminum compounds   |
| .....Pallets                        | .....Barium               |
| .....Remote handling                | .....Barium compounds     |
| .....Materials preparation          | .....Bismuth              |
| .....Doping                         | .....Boron                |
| .....Firing                         | .....Boron alloys         |
| .....Ion implantation               | .....Cadmium              |
| .....Laser sintering                | .....Cadmium compounds    |
| .....Sputtering                     | .....Calcium              |
| .....Materials reliability          | .....Calcium compounds    |
| .....Materials testing              | .....Chromium             |
| .....Accelerated aging              | .....Chromium alloys      |
| .....Acoustic testing               | .....Cobalt               |
| .....Adhesive strength              | .....Cobalt alloys        |
| .....Bonding forces                 | .....Copper               |
| .....Delamination                   | .....Copper alloys        |
| .....Elastic recovery               | .....Copper compounds     |
| .....Nondestructive testing         | .....Digital alloys       |
| .....Metallurgy                     | .....Erbium               |
| .....Microstructure                 | .....Gallium              |
| .....Periodic structures            | .....Gallium alloys       |
| .....Gratings                       | .....Germanium            |



.....Germanium alloys  
 .....Gold  
 .....Gold alloys  
 .....Hafnium  
 .....Hafnium compounds  
 .....Indium  
 .....Iron  
 .....Cast iron  
 .....Iron alloys  
 .....Lanthanum  
 .....Lanthanum compounds  
 .....Lead  
 .....Lead isotopes  
 .....Lithium  
 .....Lithium compounds  
 .....Magnesium  
 .....Magnesium compounds  
 .....Manganese  
 .....Manganese alloys  
 .....Mercury (metals)  
 .....Metallization  
 .....Integrated circuit metallization  
 .....Neodymium  
 .....Neodymium alloys  
 .....Neodymium compounds  
 .....Nickel  
 .....Nickel alloys  
 .....Nickel compounds  
 .....Niobium  
 .....Niobium alloys  
 .....Niobium compounds  
 .....Palladium  
 .....Platinum  
 .....Platinum alloys  
 .....Rare earth metals  
 .....Samarium  
 .....Samarium alloys  
 .....Silver  
 .....Steel  
 .....Martensite  
 .....Strontium  
 .....Strontium compounds  
 .....Tin  
 .....Tin alloys  
 .....Tin compounds  
 .....Titanium  
 .....Titanium alloys  
 .....Titanium compounds  
 .....Titanium dioxide  
 .....Titanium nitride  
 .....Tungsten

.....Yttrium  
 .....Yttrium compounds  
 .....Zinc  
 .....Zinc compounds

## Mathematics

....Accuracy  
 ....Algebra  
 .....Abstract algebra  
 .....Galois fields  
 .....Modules (abstract algebra)  
 .....Boolean algebra  
 .....Boolean functions  
 .....Linear algebra  
 .....Linear programming  
 .....Matrices  
 .....Vectors  
 .....Set theory  
 .....Fuzzy set theory  
 .....Fuzzy sets  
 .....Rough sets  
 ...Algorithms  
 .....Adaptive algorithms  
 .....Adaptation models  
 .....Algorithm design and analysis  
 .....Algorithmic efficiency  
 .....Generative adversarial networks  
 .....Algorithm design and theory  
 .....Backtracking  
 .....Consensus algorithm  
 .....Approximation algorithms  
 .....Artificial bee colony algorithm  
 .....Backpropagation algorithms  
 .....Basis algorithms  
 .....Change detection algorithms  
 .....Classification algorithms  
 .....Relevance vector machines  
 .....Clustering algorithms  
 .....Compression algorithms  
 .....Density estimation robust algorithm  
 .....Detection algorithms  
 .....Distributed algorithms  
 .....Dynamic programming  
 .....Filtering algorithms  
 .....Genetic algorithms  
 .....Hash functions  
 .....Cryptographic hash function  
 .....Heuristic algorithms  
 .....Inference algorithms  
 .....Machine learning algorithms



- .....Matching pursuit algorithms
- .....Maximum likelihood detection
- .....MLFMA
- .....Multicast algorithms
- .....Parallel algorithms
- .....Partitioning algorithms
- .....Prediction algorithms
- .....Projection algorithms
- .....Pursuit algorithms
- .....Signal processing algorithms
- .....Software algorithms
- .....Viterbi algorithm
- .....Whale optimization algorithms
- ...Arithmetic
  - .....Digital arithmetic
  - .....Fixed-point arithmetic
  - .....Floating-point arithmetic
- ...Azimuth
  - .....Azimuthal angle
  - .....Azimuthal component
  - .....Azimuthal current
  - .....Azimuthal harmonics
  - .....Azimuthal plane
- ...Boundary value problems
  - .....Boundary conditions
  - .....Upper bound
- ...Calculus
  - .....Differential equations
    - .....Differential algebraic equations
    - .....Differential operators
    - .....Navier-Stokes equations
    - .....Ordinary differential equations
    - .....Partial differential equations
    - .....Transfer functions
  - .....Integral equations
    - .....Probability density function
- ...Level set
  - .....Closed-form solutions
- ...Combinatorial mathematics
  - .....Graph theory
    - .....Bipartite graph
    - .....Directed acyclic graph
    - .....Directed graphs
    - .....Optimal matching
    - .....Reachability analysis
    - .....Shortest path problem
    - .....Tree graphs
    - .....Steiner trees
- ...Computational efficiency
- ...Conformal mapping
- ...Convergence
- ...Convex functions
- ...Cyclic redundancy check
  - .....Cyclic redundancy check codes
- ...Dynamical systems
  - .....Nonlinear dynamical systems
- ...Eigenvalues and eigenfunctions
- ...Equations
  - .....Boltzmann equation
  - .....Difference equations
  - .....Integrodifferential equations
  - .....Maxwell equations
  - .....Nonlinear equations
    - .....Bifurcation
    - .....Polynomials
    - .....Riccati equations
- ...Estimation
  - .....Estimation error
  - .....Estimation theory
    - .....Cramer-Rao bounds
    - .....Maximum a posteriori estimation
  - .....Functional point analysis
  - .....Life estimation
  - .....Maximum likelihood estimation
  - .....Pose estimation
  - .....State estimation
    - .....Observers
    - .....Yield estimation
- ...Euclidean distance
- ...Hilbert space
- ...Finite difference methods
- ...Finite element analysis
- ...Fourier series
- ...Functional analysis
- ...Geometry
  - .....Computational geometry
    - .....Fractals
    - .....Elliptic curves
    - .....Elliptic design
      - .....Ellipsoids
    - .....Information geometry
    - .....Projective geometry
    - .....Surface topography
      - .....Nanotopography
  - .....Gradient methods
  - .....Graph theory
    - .....Bipartite graph
    - .....Directed acyclic graph
    - .....Directed graphs
      - .....Fuzzy cognitive maps
    - .....Optimal matching
    - .....Reachability analysis



- .....Shortest path problem
- .....Tree graphs
- ....Harmonic analysis
- ....Iterative methods
  - .....Expectation-maximization algorithms
  - .....Iterative algorithms
    - .....Iterative closest point algorithm
    - .....Sum product algorithm
  - .....Iterative learning control
- ....Kernel
- .....Null space
- .....System kernels
- ....Laplace equations
- ....Lattices
  - .....Lattice Boltzmann methods
- ....Limit-cycles
- ....Linear matrix inequalities
- ....Linear systems
- ....Linearization techniques
- ....Mathematical model
  - .....Mathematical analysis
    - .....Formal concept analysis
    - .....Fractional calculus
    - .....Modal analysis
- ....Mathematical programming
- ....Method of moments
- ....Minimization
  - .....Minimization methods
- ....Mode matching methods
- ....Network theory (graphs)
- ....Nonlinear equations
  - .....Bifurcation
- ....Nonlinear systems
  - .....Chaos
    - .....Chaotic communication
    - .....Complexity theory
      - .....Spatiotemporal phenomena
- ....Nonlinear dynamical systems
- ....Numerical analysis
  - .....Adaptive mesh refinement
  - .....Approximation methods
    - .....Approximation error
      - .....Chebyshev approximation
    - .....Curve fitting
    - .....Extrapolation
    - .....Function approximation
    - .....Interpolation
    - .....Linear approximation
    - .....Mean square error methods
    - .....Perturbation methods
    - .....Convergence of numerical methods
- .....Finite difference methods
- .....Finite element analysis
- .....Finite volume methods
- .....Gradient methods
- .....Independent component analysis
- .....Iterative methods
  - .....Expectation-maximization algorithms
    - .....Iterative algorithms
      - .....Iterative learning control
  - .....Least squares approximations
    - .....Least mean squares methods
  - .....Method of moments
  - .....Mode matching methods
  - .....Multigrid methods
  - .....Newton method
  - .....Numerical simulation
  - .....Numerical stability
  - .....Relaxation methods
  - .....Sparse matrices
  - .....Splines (mathematics)
  - .....Surface fitting
    - .....Response surface methodology
  - .....Symmetric matrices
  - .....Transmission line matrix methods
- ....Optimization
  - .....Cost function
  - .....Optimal scheduling
  - .....Optimization methods
    - .....Affordances
      - .....Circuit optimization
      - .....Concave programming
      - .....Design optimization
      - .....Fireworks algorithm
      - .....Gradient methods
      - .....H infinity control
      - .....Mathematical programming
        - .....Optimized production technology
        - .....Pareto optimization
        - .....Quadratic programming
        - .....Simulated annealing
      - .....Trajectory optimization
    - .....Piecewise linear techniques
      - .....Piecewise linear approximation
    - .....Predator prey systems
  - ....Probability
    - .....Ant colony optimization
    - .....Bayes methods
      - .....Naive Bayes methods
      - .....Recursive estimation
      - .....Error probability



.....Forecasting  
 .....Demand forecasting  
 .....Economic forecasting  
 .....Forecast uncertainty  
 .....Technology forecasting  
 .....Memoryless systems  
 .....Pairwise error probability  
 .....Possibility theory  
 .....Probability distribution  
 .....Exponential distribution  
 .....Log-normal distribution  
 .....Maxwell-Boltzmann distribution  
 .....Nakagami distribution  
 .....Random variables  
 .....Statistical distributions  
 .....Distribution functions  
 .....Gaussian distribution  
 .....Weibull distribution  
 .....Uncertainty  
 .....Evidence theory  
 .....Forecast uncertainty  
 ....Quaternions  
 ....Random processes  
 .....Brownian motion  
 .....Random forests  
 ....Root mean square  
 ....Sequences  
 .....Binary sequences  
 .....Random sequences  
 ....Set theory  
 .....Fuzzy set theory  
 .....Fuzzy sets  
 .....Rough sets  
 ....Simulated annealing  
 ....Smoothing methods  
 ....Spirals  
 ....Statistics  
 .....Adaptive estimation  
 .....Autoregressive processes  
 .....Boltzmann distribution  
 .....Lattice Boltzmann methods  
 .....Correlation  
 .....Autocorrelation  
 .....Correlation coefficient  
 .....Covariance matrices  
 .....Differential privacy  
 .....Dimensionality reduction  
 .....Manifold learning  
 .....Gamma distribution  
 .....Gaussian mixture model  
 .....Higher order statistics  
 .....Histograms  
 .....Linear discriminant analysis  
 .....Maximum likelihood estimation  
 .....Minimax techniques  
 .....Mixture models  
 .....Nonparametric statistics  
 .....Nearest neighbor methods  
 .....Parametric statistics  
 .....Prediction theory  
 .....Ranking (statistics)  
 .....Root mean square  
 .....Sampling methods  
 .....Compressed sensing  
 .....Nonuniform sampling  
 .....Statistical analysis  
 .....Analysis of variance  
 .....Mode matching methods  
 .....Monte Carlo methods  
 .....Parameter estimation  
 .....Pareto analysis  
 .....Predictive analytics  
 .....Principal component analysis  
 .....Regression analysis  
 .....Static analysis  
 .....Time series analysis  
 ....Stochastic processes  
 .....Gaussian processes  
 .....Gaussian mixture model  
 .....Markov processes  
 .....Markov random fields  
 ....Superposition calculus  
 ....Taylor series  
 ....Tensors  
 ....Topology  
 ....Transforms  
 .....Discrete transforms  
 .....Discrete cosine transforms  
 .....Empirical mode decomposition  
 .....Fourier transforms  
 .....Discrete Fourier transforms  
 .....Fast Fourier transforms  
 .....Fourier transform infrared spectroscopy  
 .....Karhunen-Loeve transforms  
 .....Poincare invariance  
 .....Wavelet transforms  
 .....Biorthogonal modulation  
 .....Continuous wavelet transforms  
 .....Discrete wavelet transforms  
 .....Wavelet coefficients  
 .....Wavelet packets



- ....Transmission line matrix methods
- ....Uncertain systems
- ....Utility theory

### **Microwave theory and techniques**

- ....Microwave technology
  - .....Baluns
  - .....Beam steering
  - .....Steerable antennas
  - .....Circulators
  - .....Masers
  - .....Gyrotrons
  - .....Microwave bands
    - .....C-band
    - .....K-band
    - .....L-band
  - .....Microwave circuits
  - .....Microwave communication
    - .....Rectennas
  - .....Microwave devices
    - .....Masers
    - .....Microwave amplifiers
    - .....Microwave filters
    - .....Microwave transistors
  - .....Microwave generation
    - .....High power microwave generation
  - .....Microwave photonics
  - .....Microwave sensors
- ....Millimeter wave technology
  - .....Millimeter wave circuits
    - .....Millimeter wave integrated circuits
    - .....Millimeter wave devices
    - .....Millimeter wave transistors
  - .....Millimeter wave integrated circuits
  - .....MIMICs
  - .....Millimeter wave radar
- ....Submillimeter wave technology
  - .....Submillimeter wave circuits
    - .....Submillimeter wave integrated circuits
  - .....Submillimeter wave communication
  - .....Submillimeter wave devices
  - .....Submillimeter wave filters
  - .....Submillimeter wave integrated circuits

### **Nanotechnology**

- ....Bionanotechnology
- ....Casimir effect
- ....Molecular computing

- ....Molecular electronics
- ....Nanobioscience
  - .....DNA computing
  - .....Nanobiotechnology
  - .....Nanobiophotonics
- ....Nanocommunication (telecommunication)
- ....Nanoelectromechanical systems
- ....Nanoelectronics
  - .....Junctionless nanowire transistors
- ....Nanofabrication
- ....Nanofluidics
- ....Nanolithography
- ....Nanomaterials
  - .....Nanocarriers
- ....Nanopackaging
- ....Nanopatterning
  - .....Colloidal lithography
- ....Nanophotonics
- ....Nanopositioning
- ....Nanoscale devices
  - .....Nanocontacts
  - .....Nanotube devices
- ....Nanosensors
- ....Nanostructured materials
  - .....Nanocomposites
  - .....Nanoporous materials
- ....Nanostructures
  - .....Nanoparticles
    - .....Magnetic nanoparticles
    - .....Nanocrystals
  - .....Nanoribbons
  - .....Nanotubes
    - .....Carbon nanotubes
    - .....Semiconductor nanotubes
  - .....Nanowires
  - .....Semiconductor nanostructures
- ....Self-assembly
  - .....Electrostatic self-assembly
- ....Self-replicating machines

### **Nuclear and plasma sciences**

- ....Biomedical applications of radiation
- ....Colliding beam devices
  - .....Colliding beam accelerators
- ....Muon colliders
- ....Electron emission
  - .....Ballistic transport
- .....Electronic ballasts
- ....Elementary particles



- .....Charge carriers
- .....Charge carrier density
- .....Charge carrier lifetime
- .....Charge carrier mobility
- .....Charge carrier processes
- .....Hot carriers
- .....Electrons
- .....Electron sources
- .....Quantum wells
- .....Trions
- .....Elementary particle exchange interactions
- .....Elementary particle vacuum
- .....Ions
- .....Ion sources
- .....Ionization
- .....Mesons
- .....Neutrino sources
- .....Neutrons
- .....Particle beams
- .....Atomic beams
- .....Electron beams
- .....Ion beams
- .....Particle collisions
- .....Phonons
- .....Positrons
- .....Protons
- ....Fusion power generation
- ....Fusion reactors
- ....Fusion reactor design
- .....Tokamaks
- .....Tokamak devices
- ....Gamma-rays
- .....Gamma-ray bursts
- .....Gamma-ray detection
- .....Gamma-ray effects
- ....Gas discharge devices
- ....Glow discharge devices
- ....High energy physics instrumentation computing
- .....Linear particle accelerator
- ....Ion beam applications
- .....Ion implantation
- .....Plasma immersion ion implantation
- ....Nuclear electronics
- ....Nuclear imaging
- .....Energy resolution
- .....Ion emission
- ....Nuclear medicine
- ....Nuclear physics
- .....Alpha particles
- .....Beta rays
- .....Ignition
- .....Ion sources
- .....Isotopes
- .....Nuclear phase transformations
- .....Nuclear thermodynamics
- .....Relativistic effects
- .....Optical flow
- ....Particle accelerators
- .....Accelerator magnets
- .....Colliding beam accelerators
- .....Cyclotrons
- .....Electron accelerators
- .....Ion accelerators
- .....Linear accelerators
- .....Photon collider
- .....Plasma accelerators
- .....Proton accelerators
- .....Storage rings
- .....Synchrocyclotrons
- .....Synchrotrons
- .....Synchrotron radiation
- .....Undulators
- ....Particle beam handling
- ....Particle beam injection
- ....Plasmas
- .....Atmospheric-pressure plasmas
- .....Low-temperature plasmas
- .....Plasma applications
- .....Plasma devices
- .....Plasma immersion ion implantation
- .....Plasma welding
- .....Tokamaks
- .....Plasma confinement
- .....Inertial confinement
- .....Magnetic confinement
- .....Plasma diagnostics
- .....Plasma properties
- .....Dusty plasmas
- .....Plasma chemistry
- .....Plasma density
- .....Plasma sheaths
- .....Plasma stability
- .....Plasma temperature
- .....Plasmons
- .....Plasma simulation
- .....Plasma sources
- .....Plasma transport processes
- .....Plasma-assisted combustion
- ....Radiation effects
- .....Biological effects of radiation





- .....Gamma-ray effects
- .....Ion radiation effects
- .....Neutron radiation effects
- .....Scintillators
- .....Single event latchup
- .....Space radiation
- .....Terahertz radiation
- .....Total ionizing dose
- ....Radiation hardening (electronics)
- ....Radiation monitoring
- .....Radiation dosage
- ....Radiation safety
- .....Radiation protection
- ....Reactor instrumentation
- ....Scintillation counters
- .....Solid scintillation detectors
- ....Thermionic emission

### **Oceanic engineering and marine technology**

- ....Marine navigation
- ....Marine technology
  - .....Marine equipment
  - .....Marine transportation
  - .....Marine vehicles
  - .....Underwater cables
  - .....Underwater communication
  - .....Underwater equipment
    - .....Rebreathing equipment
  - .....Underwater structures
  - .....Underwater technology
    - .....Marine robots
      - .....Underwater communication
      - .....Underwater equipment
      - .....Underwater structures
  - ....Ocean temperature
  - ....Oceanographic techniques
  - ....Water pollution
    - .....Marine pollution

### **Power electronics**

- ....Adiabatic
- ....Converters
  - .....AC-AC converters
  - .....DC-AC power converters
  - .....Digital-to-frequency converters
  - .....Frequency conversion
    - .....Mixers
    - .....Optical frequency conversion

- .....Multilevel converters
- .....Power conversion
  - .....AC-AC converters
  - .....AC-DC power converters
  - .....DC-AC power converters
  - .....DC-DC power converters
  - .....Matrix converters
  - .....Power conversion harmonics
  - .....Voltage-source converters
    - .....Pulse width modulation converters
  - .....Resonant converters
  - .....Static power converters
  - .....Voltage-source converters
  - .....Wavelength converters
- ....Current limiters
  - .....Fault current limiters
- ....Gate drivers
- ....Inverters
  - .....Multilevel inverters
  - .....Pulse inverters
  - .....Resonant inverters
  - .....Voltage source inverters
- ....Phase control
  - .....Power conditioning
  - .....Power smoothing
  - .....Power semiconductor devices
    - .....Power transistors
      - .....Power semiconductor switches
        - .....Bipolar transistors
          - .....Insulated gate bipolar transistors
            - .....Kirk field collapse effect
          - .....Thyristors
            - .....Photothyristors
  - ....Snubbers
  - ....Three-phase electric power

### **Power engineering and energy**

- ....Electric variables control
  - .....Current control
    - .....Electric current control
      - .....Electrical ballasts
    - .....Gain control
    - .....Power control
      - .....Power system control
        - .....Bidirectional power flow
        - .....Load flow control
        - .....SCADA systems
      - .....Reactive power control
      - .....Voltage control
        - .....Automatic voltage control



....Energy  
 .....Energy barrier  
 .....Energy capture  
 .....Energy consumption  
 .....Energy conversion  
 .....Atomic batteries  
 .....Batteries  
 .....Fuel cells  
 .....Motors  
 .....Photovoltaic cells  
 .....Potential well  
 .....Solar heating  
 .....Thermoelectricity  
 .....Waste heat  
 .....Wave energy conversion  
 .....Wind energy conversion  
 .....Energy dissipation  
 .....Energy exchange  
 .....Inductive charging  
 .....Energy harvesting  
 .....Nanogenerators  
 .....Energy management  
 .....Demand side management  
 .....Energy conservation  
 .....Energy efficiency  
 .....Energy informatics  
 .....Energy management systems  
 .....Load management  
 .....Transactive energy  
 .....Energy resources  
 .....Fuels  
 .....Geothermal energy  
 .....Nuclear fuels  
 .....Solar energy  
 .....Wave power  
 .....Wind energy  
 .....Wind farms  
 .....Energy states  
 .....Effective mass  
 .....Orbital calculations  
 .....Polaritons  
 .....Surface states  
 .....Energy storage  
 .....Batteries  
 .....Flywheels  
 .....Fuel cells  
 .....Hydrogen storage  
 .....Supercapacitors  
 .....Superconducting magnetic energy storage  
 ....Power engineering  
 .....Ferroresonance  
 .....High-voltage techniques  
 .....Power engineering computing  
 .....Power system simulation  
 ....Power generation  
 .....Automatic generation control  
 .....Cogeneration  
 .....Distributed power generation  
 .....Geothermal power generation  
 .....Hydroelectric power generation  
 .....Hydroelectric-thermal power generation  
 .....Microhydro power  
 .....Picohydro power  
 .....Wave energy conversion  
 .....Magnetohydrodynamic power generation  
 .....Nuclear power generation  
 .....Atomic batteries  
 .....Fission reactors  
 .....Fusion power generation  
 .....Power generation control  
 .....Power generation dispatch  
 .....Power generation planning  
 .....Power generation reliability  
 .....Solar power generation  
 .....Maximum power point trackers  
 .....Photovoltaic systems  
 .....Solar panels  
 .....Trigeneration  
 .....Turbomachinery  
 .....Turbines  
 .....Turbogenerators  
 .....Wind energy generation  
 .....Wind energy integration  
 .....Wind power generation  
 .....Wind energy conversion  
 ....Power systems  
 .....Data center power  
 .....Hybrid power systems  
 .....Industrial power systems  
 .....Power distribution  
 .....DC distribution systems  
 .....Power distribution control  
 .....Power distribution faults  
 .....Power distribution lines  
 .....Power distribution networks  
 .....Power distribution planning  
 .....Power distribution reliability  
 .....Power grids  
 .....Microgrids



|                                       |                                    |
|---------------------------------------|------------------------------------|
| .....Smart grids                      | .....Substation protection         |
| .....Power supplies                   | .....Transformers                  |
| .....Battery chargers                 | .....Baluns                        |
| .....Charging stations                | .....Current transformers          |
| .....Current supplies                 | .....Flyback transformers          |
| .....Emergency power supplies         | .....High-frequency transformers   |
| .....Inductive charging               | .....Instrument transformers       |
| .....Islanding                        | .....Phase transformers            |
| .....Power demand                     | .....Power transformers            |
| .....Power quality                    | .....Pulse transformers            |
| .....Power system restoration         | .....Tap changers                  |
| .....Switched mode power supplies     | .....Uninterruptible power systems |
| .....Traction power supplies          | .....Wind energy integration       |
| .....Umbilical cable                  |                                    |
| .....Power system analysis computing  | <b>Product safety engineering</b>  |
| .....Power system dynamics            | ....Consumer protection            |
| .....Power system economics           | ....Power system protection        |
| .....Low-carbon economy               | .....Electrical safety             |
| .....Power system faults              | .....Fault protection              |
| .....Power system harmonics           | .....Grounding                     |
| .....Power harmonic filters           | .....Substation protection         |
| .....Power system management          | .....Surge protection              |
| .....Load flow                        | .....Arresters                     |
| .....Power system measurements        | ....Safety                         |
| .....Meter reading                    | .....Aerospace safety              |
| .....Power system planning            | .....Air safety                    |
| .....Power demand                     | .....Domestic safety               |
| .....Power distribution planning      | .....Fall detection                |
| .....Power system protection          | .....Emergency services            |
| .....Electrical safety                | .....Explosion protection          |
| .....Substation protection            | .....Fire safety                   |
| .....Surge protection                 | .....Hazards                       |
| .....Power system reliability         | .....Biohazards                    |
| .....Power distribution reliability   | .....Chemical hazards              |
| .....Power system stability           | .....Explosions                    |
| .....Power transmission               | .....Fires                         |
| .....Common Information Model         | .....Flammability                  |
| (electricity)                         | .....Floods                        |
| .....DC power transmission            | .....Hazardous areas               |
| .....Flexible AC transmission systems | .....Hazardous materials           |
| .....HVDC transmission                | .....Toxicology                    |
| .....Inductive power transmission     | .....Health and safety             |
| .....Static VAR compensators          | .....Occupational health           |
| .....Transmission lines               | .....Occupational safety           |
| .....Wireless power transmission      | .....Personal protective equipment |
| .....PSCAD                            | .....Marine safety                 |
| .....Pulsed power systems             | .....Product safety                |
| .....Pulsed power supplies            | .....Protection                    |
| .....Reactive power                   | .....Explosion protection          |
| .....Substations                      | .....Lightning protection          |
| .....Substation automation            |                                    |



- .....Radiation protection
- .....Radiation safety
- .....Radiation protection
- .....Safety devices
- .....Eye protection
- .....Fire extinguishers
- .....Protective clothing
- .....Safety management
- .....Vehicle safety
- .....Advanced driver assistance systems
- .....Lane departure warning systems
- .....Lane detection
- ....Vehicle crash testing

### Professional communication

- ....Collaboration
- .....Collaborative tools
- .....Call conference
- .....Collaborative software
- .....Videoconferences
- .....Discussion forums
- .....Teamwork
- .....Virtual groups
- ....Communication aids
- .....Closed captioning
- ....Communication effectiveness
- ....Communication symbols
- .....Semiotics
- .....Pragmatics
- .....Semantics
- .....Syntactics
- ....Context
- ....Databases
- .....Database systems
- .....Audio databases
- .....Deductive databases
- .....Image databases
- .....Indexes
- .....Multimedia databases
- .....NoSQL databases
- .....Object oriented databases
- .....Query processing
- .....Deductive databases
- .....Distributed databases
- .....Image databases
- .....Image retrieval
- .....Multimedia databases
- .....Object oriented databases
- .....Relational databases

- .....Spatial databases
- .....Transaction databases
- .....Itemsets
- .....Visual databases
- ....Global communication
- .....Cross-cultural communication
- .....Geographic information systems
- .....Geospatial analysis
- .....Gunshot detection systems
- ....Grammar
- ....Information analysis
- .....Decision analysis
- .....Indexing
- ....Information integrity
- ....Information resources
- ....Information retrieval
- .....Blogs
- .....Content-based retrieval
- .....Dimensionality reduction
- .....Manifold learning
- .....Hypertext systems
- .....Information filtering
- .....Information filters
- .....Recommender systems
- .....Information rates
- .....Music information retrieval
- .....Online services
- .....Online banking
- .....Search engines
- .....Search methods
- .....Keyword search
- .....Metasearch
- .....Search problems
- .....Semantic search
- .....Web search
- .....Social networking (online)
- .....Computer mediated communication
- .....MySpace
- .....Second Life
- .....Tagging
- .....Tag clouds
- .....Taxonomy
- .....Terminology
- .....Dictionaries
- .....Video sharing
- .....MySpace
- .....Vocabulary
- .....Web sites
- .....Multimedia Web sites
- .....MySpace
- .....Uniform resource locators



.....Web design  
 ....Information science  
 .....Quantum information science  
 .....Quantum channel  
 .....Quantum circuit  
 ....Information services  
 .....Ask IEEE  
 .....Dictionaries  
 .....Document delivery  
 .....Ask IEEE  
 .....Encyclopedias  
 .....Libraries  
 .....Software libraries  
 .....Teletext  
 .....Videotex  
 .....Wikipedia  
 ....Information systems  
 .....Data systems  
 .....Data acquisition  
 .....Data centers  
 .....Data compression  
 .....Data conversion  
 .....Data engineering  
 .....Data handling  
 .....Data processing  
 .....Data storage systems  
 .....Data warehouses  
 .....Database systems  
 .....Audio databases  
 .....Deductive databases  
 .....Image databases  
 .....Indexes  
 .....Multimedia databases  
 .....NoSQL databases  
 .....Object oriented databases  
 .....Query processing  
 .....Distributed information systems  
 .....Distributed management  
 .....Publish-subscribe  
 .....Identity management systems  
 .....Informatics  
 .....Bioinformatics  
 .....Cognitive informatics  
 .....Energy informatics  
 .....Neuroinformatics  
 .....Information architecture  
 .....Enterprise architecture  
 management  
 .....Information management  
 .....Common Information Model  
 (computing)  
 .....Common Information Model  
 (electricity)  
 .....Competitive intelligence  
 .....Digital preservation  
 .....Document handling  
 .....Enterprise architecture  
 management  
 .....Information security  
 .....Information sharing  
 .....Knowledge transfer  
 .....Information processing  
 .....Digital agriculture  
 .....Electronic healthcare  
 .....Informatics  
 .....Information exchange  
 .....Sonification  
 .....Management information systems  
 .....Portals  
 .....Medical information systems  
 .....Electronic medical records  
 ....Information technology  
 .....Bring your own device  
 .....Information age  
 .....Information and communication  
 technology  
 .....Ambient assisted living  
 .....Information representation  
 .....Digital representation  
 .....Printing  
 .....Digital printing  
 .....Ink jet printing  
 .....Teleprinting  
 .....Three-dimensional printing  
 .....Semantic technology  
 .....Service computing  
 .....Service level agreements  
 .....Telematics  
 .....Universal Serial Bus  
 ...Manuals  
 ...Meetings  
 .....Conferences  
 ...Oral communication  
 .....Public speaking  
 .....Speech  
 ...Plagiarism  
 ...Portfolios  
 ...Professional societies  
 ...Public speaking  
 ...Rhetoric  
 ...Writing  
 .....Abstracts



- .....Bibliographies
- .....Biographies
- .....Autobiographies
- .....Dictionaries
- .....Documentation
- .....Point of care
- .....Grammar
- .....Readability metrics
- .....Resumes
- .....Reviews
- .....Thesauri

### Reliability

- ....Availability
- ....Fault diagnosis
- .....Dissolved gas analysis
- .....Fault location
- ....Fault tolerance
- .....Fault tolerant control
- .....Redundancy
- ....Fluctuations
- ....Integrated circuit reliability
- ....Maintenance
- ....Maldistribution
- ....Materials reliability
- ....Reliability engineering
- ....Reliability theory
- ....Robustness
- ....Semiconductor device reliability
- ....Software reliability
- ....Stability
- .....Circuit stability
- .....Robust stability
- .....Stability analysis
- .....Stability criteria
- .....Thermal stability
- ....Telecommunication network reliability
- .....Diversity schemes

### Resonance

- ....Ferroresonance
- ....Magnetic resonance
- .....Antiferromagnetic resonance
- .....Ferromagnetic resonance
- .....Nuclear magnetic resonance
- .....Paramagnetic resonance
- ....Resonance light scattering
- ....Stochastic resonance

### Robotics and automation

- ....Animatronics
- ....Automation
- .....Automated highways
- .....Automatic generation control
- .....Automatic testing
- .....Automatic test pattern generation
- .....Ring generators
- .....Building automation
- .....Manufacturing automation
- .....Computer aided manufacturing
- .....Computer integrated manufacturing
- .....Computer numerical control
- .....Flexible manufacturing systems
- .....Office automation
- .....Workflow management software
- .....Storage automation
- .....Vehicular automation
- ....Autonomous systems
- .....Autonomous robots
- .....Autonomous vehicles
- .....Unmanned autonomous vehicles
- ....Multi-robot systems
- .....Swarm robotics
- ....Robots
- .....Agricultural robots
- .....Androids
- .....Aquatic robots
- .....Automata
- .....Turing machines
- .....Autonomous robots
- .....Bio-inspired robotics
- .....Cognitive robotics
- .....Computer vision
- .....Active appearance model
- .....Blob detection
- .....Corner detection
- .....Face detection
- .....Feature detection
- .....Interest point detection
- .....Smart cameras
- .....Visual odometry
- .....Educational robots
- .....Evolutionary robotics
- .....Humanoid robots
- .....Intelligent robots
- .....Manipulators
- .....End effectors
- .....Manipulator dynamics
- .....Micromanipulators



- .....Marine robots
- .....Medical robotics
- .....Rehabilitation robotics
- .....Mobile robots
- .....Autonomous automobiles
- .....Climbing robots
- .....Legged locomotion
- .....Orbital robotics
- .....Parallel robots
- .....Rehabilitation robotics
- .....Rescue robots
- .....Robot control
- .....Robot motion
- .....Robot kinematics
- .....Motion analysis
- .....Robot learning
- .....Robot programming
- .....Robot sensing systems
- .....Robot vision systems
- .....Simultaneous localization and mapping
- .....Tactile sensors
- .....Service robots
- .....Snake robots
- .....Soft robotics
- .....Telerobotics
- .....Teleoperators
- .....Visual odometry
- .....Wearable robots

### Science – general

- ....Astronomy
- .....Astrophysics
- .....Dark matter
- .....Orbits
- .....Stellar dynamics
- .....Extrasolar planets
- .....Extrasolar planetary atmospheres
- .....Extrasolar planetary mass
- .....Gravitational waves
- .....Observatories
- .....Radio astronomy
- .....Solar system
- .....Kuiper belt
- .....Planets
- .....Satellites
- .....Sun
- ....Biology
- .....Biochemistry
- .....Amino acids

- .....Biochemical analysis
- .....Peptides
- .....Proteins
- .....Receptor (biochemistry)
- .....Biodiversity
- .....Biogeography
- .....Bioelectric phenomena
- .....Electric shock
- .....Biological cells
- .....Cell signaling
- .....Cells (biology)
- .....Chromosome mapping
- .....Endothelial cells
- .....Fibroblasts
- .....RNA
- .....Stem cells
- .....Biological information theory
- .....Biological processes
- .....Biological interactions
- .....Chronobiology
- .....Circadian rhythm
- .....Coagulation
- .....Molecular biology
- .....Symbiosis
- .....Biological system modeling
- .....Biological systems
- .....Anatomy
- .....Molecular communication (telecommunication)
- .....Organisms
- .....Biology computing
- .....Biophotonics
- .....Biophysics
- .....Aerospace biophysics
- .....Biomagnetics
- .....Cellular biophysics
- .....Molecular biophysics
- .....Cryobiology
- .....Evolution (biology)
- .....Memetics
- .....Phylogeny
- .....Genetics
- .....DNA
- .....Epigenetics
- .....Gene therapy
- .....Genetic communication
- .....Genetic expression
- .....Genetic programming
- .....Genomics
- .....Homeostasis
- .....Mechanobiology





|                              |                                 |
|------------------------------|---------------------------------|
| .....Microbiology            | .....Photocatalysis             |
| .....Electroporation         | .....Quantum chemistry          |
| .....Virology                | ...Electricity                  |
| .....Microinjection          | .....Photoelectricity           |
| .....Nanobioscience          | .....Photovoltaic effects       |
| .....DNA computing           | .....Piezoelectricity           |
| .....Nanobiotechnology       | .....Piezoelectric effect       |
| .....Physiology              | .....Piezoelectric polarization |
| .....Action potentials       | .....Pyroelectricity            |
| .....External stimuli        | .....Thermoelectricity          |
| .....Neuromodulation         | .....Electrothermal effects     |
| .....Predator prey systems   | .....Peltier effect             |
| .....Synthetic biology       | .....Thermoelectric devices     |
| .....Systematics             | .....Thermoelectric materials   |
| .....Systems biology         | .....Triboelectricity           |
| .....Vegetation              | ...Epidemiology                 |
| .....Crops                   | .....Epidemics                  |
| .....Marine vegetation       | .....Pandemics                  |
| .....Zoology                 | ...Geoscience                   |
| .....Animals                 | .....Antarctica                 |
| .....Entomology              | .....South Pole                 |
| ...Chemistry                 | .....Arctic                     |
| .....Astrochemistry          | .....North Pole                 |
| .....Biochemistry            | .....Atmosphere                 |
| .....Amino acids             | .....Air quality                |
| .....Biochemical analysis    | .....Atmospheric modeling       |
| .....Peptides                | .....Atmospheric waves          |
| .....Proteins                | .....Biosphere                  |
| .....Receptor (biochemistry) | .....Continents                 |
| .....Chemical analysis       | .....Africa                     |
| .....Activation analysis     | .....Asia                       |
| .....Chemical processes      | .....Australia                  |
| .....Chemicals               | .....Europe                     |
| .....Electronic noses        | .....North America              |
| .....pH measurement          | .....South America              |
| .....Chemical compounds      | .....Cyclones                   |
| .....Anti-freeze             | .....Hurricanes                 |
| .....Bromine compounds       | .....Tropical cyclones          |
| .....Chalcogenides           | .....Earth                      |
| .....Ethanol                 | .....Earthquakes                |
| .....Methanol                | .....Earthquake engineering     |
| .....Radiotracer             | .....Forestry                   |
| .....Electrochemistry        | .....Geochemistry               |
| .....Electrocatalysis        | .....Geoengineering             |
| .....Geochemistry            | .....Geography                  |
| .....Inorganic chemicals     | .....Rural areas                |
| .....Interstellar chemistry  | .....Urban areas                |
| .....Organic chemicals       | .....Geology                    |
| .....Hydrocarbons            | .....Landslides                 |
| .....Photochemistry          | .....Minerals                   |
| .....Photobleaching          | .....Rocks                      |



|                                 |  |
|---------------------------------|--|
| .....Geophysics                 | .....Systems neuroscience                    |
| .....EMTDC                      | .....Transcranial direct current stimulation |
| .....Extraterrestrial phenomena | .....Transcranial magnetic stimulation       |
| .....Geodynamics                | ....Physics                                  |
| .....Geophysics computing       | .....Acoustics                               |
| .....Meteorology                | .....Acoustic applications                   |
| .....Moisture                   | .....Acoustic devices                        |
| .....Seismology                 | .....Acoustic emission                       |
| .....Surface waves              | .....Acoustic field                          |
| .....Well logging               | .....Acoustic noise                          |
| .....Ice                        | .....Acoustic phonetics                      |
| .....Ice shelf                  | .....Acoustic propagation                    |
| .....Ice surface                | .....Acoustic pulses                         |
| .....Ice thickness              | .....Acoustic waves                          |
| .....Sea ice                    | .....Acoustooptic effects                    |
| .....Lakes                      | .....Biomedical acoustics                    |
| .....Land surface               | .....Cepstral analysis                       |
| .....Levee                      | .....Music                                   |
| .....Meteorological factors     | .....Nonlinear acoustics                     |
| .....Oceanography               | .....Psychoacoustics                         |
| .....Ocean circulation          | .....Reverberation                           |
| .....Oceans                     | .....Spectral shape                          |
| .....Ocean salinity             | .....Underwater acoustics                    |
| .....Ocean temperature          | .....Astrophysics                            |
| .....Sea coast                  | .....Dark matter                             |
| .....Sea floor                  | .....Orbits                                  |
| .....Sea level                  | .....Stellar dynamics                        |
| .....Sea surface                | .....Beams                                   |
| .....Tides                      | .....Acoustic beams                          |
| .....Rivers                     | .....Laser beams                             |
| .....Sediments                  | .....Molecular beams                         |
| .....Soil                       | .....Optical beams                           |
| .....Soil moisture              | .....Particle beams                          |
| .....Soil properties            | .....Biophysics                              |
| .....Soil texture               | .....Aerospace biophysics                    |
| .....Tornadoes                  | .....Biomagnetics                            |
| .....Tsunami                    | .....Cellular biophysics                     |
| .....Volcanoes                  | .....Molecular biophysics                    |
| .....Planetary volcanoes        | .....Dark energy                             |
| .....Volcanic activity          | .....Entropy                                 |
| .....Volcanic ash               | .....Fluid flow                              |
| .....Wetlands                   | .....Fluid dynamics                          |
| ....History                     | .....Hydraulic diameter                      |
| ....Life sciences               | .....Hydrology                               |
| ....Metrology                   | .....Pipelines                               |
| .....Optical metrology          | .....Valves                                  |
| ....Neuroscience                | .....Geophysics                              |
| .....Clinical neuroscience      | .....EMTDC                                   |
| .....Cognitive neuroscience     | .....Extraterrestrial phenomena              |
| .....Computational neuroscience | .....Geodynamics                             |
| .....Neuroinformatics           | .....Geophysics computing                    |



- .....Meteorology
- .....Moisture
- .....Seismology
- .....Surface waves
- .....Well logging
- .....High energy physics
- .....Kinetic theory
- .....Kinetic energy
- .....Levitation
- .....Electrostatic levitation
- .....Magnetic levitation
- .....Lorentz covariance
- .....Mechanical factors
- .....Acceleration
- .....Aerodynamics
- .....Bending
- .....Biomechanics
- .....Damping
- .....Dynamics
- .....Fatigue
- .....Force
- .....Friction
- .....Hydrodynamics
- .....Kinematics
- .....Lubrication
- .....Magnetohydrodynamics
- .....Photoelasticity
- .....Pressure effects
- .....Shock (mechanics)
- .....Strain
- .....Stress
- .....Surface cracks
- .....Surface stress
- .....Torque
- .....Vibrations
- .....Volume relaxation
- .....Workability
- .....Network theory (graphs)
- .....Physics education
- .....Quantum mechanics
- .....Coherence time
- .....Density functional theory
- .....Lagrangian functions
- .....Proton effects
- .....Quantum capacitance
- .....Quantum cryptography
- .....Quantum decoherence
- .....Quantum entanglement
- .....Quantum information science
- .....Quantum key distribution
- .....Quantum optics
- .....Quantum simulation
- .....Quantum state
- .....Quantum system
- .....Relativistic quantum mechanics
- .....Schrodinger equation
- .....Stationary state
- .....Teleportation
- .....Tunneling
- .....Rydberg atoms
- .....Solid-state physics
- .....String theory
- .....Thermal factors
- .....Temperature
- .....Temperature dependence
- .....Thermal conductivity
- .....Thermal expansion
- .....Thermal management
- .....Thermal stresses
- .....Thermoelasticity
- .....Thermoelectricity
- .....Thermolysis
- .....Thermooptic effects
- .....Thermoresistivity
- .....Waves
- .....Atmospheric waves
- .....Berry phase
- .....Doppler effect
- .....Electrodynamics
- .....Magnetostatic waves
- .....Matter waves
- .....Plasma waves
- .....Propagation
- .....Reflectivity
- .....Seismic waves
- .....Shock waves
- .....Solitons
- .....Surface acoustic waves
- .....Wave functions
- .....Social sciences
- .....Behavioral sciences
- .....Animal behavior
- .....Cognition
- .....Consumer behavior
- .....Psychiatry
- .....Psychology
- .....Social intelligence
- .....Journalism
- .....Psychology
- .....Active perception
- .....Emotional responses
- .....Industrial psychology



- .....Mental health
- .....Mood
- .....Neuropsychology
- .....Psychometric testing
- .....Sociology
- .....Digital divide
- .....Social groups
- .....Social intelligence
- ....Thermodynamics
- .....Enthalpy
- .....Isobaric
- .....Isothermal processes

### Sensors

- ....Acoustic sensors
- ....Chemical and biological sensors
  - .....Biosensors
  - .....Gas detectors
  - .....Amperometric sensors
- ....Electromechanical sensors
  - .....Microsensors
- ....Force sensors
- ....Glucose sensors
- ....Inertial sensors
- ....Infrared sensors
- ....Intelligent sensors
- ....Intracranial pressure sensors
- ....Ionizing radiation sensors
  - .....Position sensitive particle detectors
  - .....Radiation detectors
    - .....Bolometers
    - .....Gamma-ray detectors
    - .....Infrared detectors
    - .....Photodetectors
    - .....Semiconductor radiation detectors
    - .....Silicon radiation detectors
  - .....X-ray detectors
- ....Magnetic sensors
  - .....Spin valves
- ....Mechanical sensors
  - .....Capacitive sensors
- ....Multimodal sensors
- ....Nanosensors
- ....Optical sensors
  - .....Optical detectors
    - .....Bar codes
    - .....Optical fiber sensors
- ....Optoelectronic and photonic sensors
- ....Pressure sensors
- ....Sensor phenomena and characterization

- ....Sensor placement
- ....Sensor systems and applications
  - .....Detectors
    - .....Envelope detectors
    - .....Semiconductor detectors
    - .....Electric sensing devices
    - .....Leak detection
    - .....Radiofrequency identification
      - .....RFID tags
    - .....Robot sensing systems
    - .....Robot vision systems
    - .....Simultaneous localization and mapping
      - .....Tactile sensors
      - .....Sensor arrays
      - .....Sensor fusion
      - .....Sensor systems
        - .....Activity recognition
        - .....Gunshot detection systems
  - ....Thermal sensors
    - .....Electrothermal actuators
    - .....Temperature sensors
      - .....Thermometers
    - ....Thick film sensors
    - ....Thin film sensors
    - ....Vision sensors
    - ....Wearable sensors

### Signal processing

- ....Acoustic signal processing
  - .....Active noise reduction
    - .....Echo cancellers
  - .....Speech processing
    - .....Human voice
    - .....Speech enhancement
    - .....Speech synthesis
    - .....Voice activity detection
- ....Adaptive signal processing
  - .....Adaptive filters
  - .....Adaptive signal detection
- ....Amplifiers
  - .....Broadband amplifiers
  - .....Differential amplifiers
  - .....Distributed amplifiers
  - .....Low-noise amplifiers
  - .....Operational amplifiers
    - .....Feedback amplifiers
    - .....Power amplifiers
      - .....High power amplifiers
  - .....Predistortion



|  |  |
|--|--|
| .....Preamplifiers                       | .....Collaborative filtering             |
| .....Pulse amplifiers                    | .....Image filtering                     |
| .....Radiofrequency amplifiers           | .....Gabor filters                       |
| .....Resonators                          | .....Harmonic filters                    |
| .....Cavity resonators                   | .....IIR filters                         |
| .....Split ring resonators               | .....Kalman filters                      |
| ....Array signal processing              | .....Low-pass filters                    |
| ....Attenuators                          | .....Matched filters                     |
| .....Optical attenuators                 | .....Microstrip filters                  |
| ....Chirp                                | .....Nonlinear filters                   |
| ....Convolution                          | .....Notch filters                       |
| .....Convolver                           | .....Particle filters                    |
| ....Decorrelation                        | .....Power filters                       |
| ....Digital signal processing            | .....Spurline                            |
| .....Delta modulation                    | .....Resonator filters                   |
| .....Delta-sigma modulation              | .....Spatial filters                     |
| .....Sigma-delta modulation              | .....Superconducting filters             |
| .....Digital signal processing chips     | .....Transversal filters                 |
| ....Dispersion                           | ....Frequency locked loops               |
| .....Chromatic dispersion                | ....Geophysical signal processing        |
| .....Optical fiber dispersion            | ....Limiting                             |
| ....Distortion                           | ....Modulation                           |
| .....Acoustic distortion                 | .....Amplitude modulation                |
| .....Four-wave mixing                    | .....Amplitude shift keying              |
| .....Jitter                              | .....Quadrature amplitude modulation     |
| .....Timing jitter                       | .....Chirp modulation                    |
| .....Nonlinear distortion                | .....Demodulation                        |
| .....Harmonic distortion                 | .....Digital modulation                  |
| .....Intermodulation distortion          | .....Constellation diagram               |
| .....Phase distortion                    | .....Partial response signaling          |
| ....Error correction                     | .....Frequency modulation                |
| .....Forward error correction            | .....Frequency shift keying              |
| ....Fading channels                      | .....Magnetic modulators                 |
| .....Frequency-selective fading channels | .....Modulation coding                   |
| .....Rayleigh channels                   | .....Interleaved codes                   |
| .....Weibull fading channels             | .....Optical modulation                  |
| ....Filters                              | .....Electrooptic modulators             |
| .....Active filters                      | .....Intensity modulation                |
| .....Band-pass filters                   | .....Phase modulation                    |
| .....Anisotropic                         | .....Continuous phase modulation         |
| .....Bragg gratings                      | .....Differential phase shift keying     |
| .....Fiber gratings                      | .....Phase shift keying                  |
| .....Channel bank filters                | .....Pulse modulation                    |
| .....Comb filters                        | .....Pulse width modulation              |
| .....Digital filters                     | .....Pulse width modulation inverters    |
| .....Finite impulse response filters     | .....Space vector pulse width modulation |
| .....Equalizers                          | ....Multidimensional signal processing   |
| .....Adaptive equalizers                 | .....Video signal processing             |
| .....Blind equalizers                    | .....Motion artifacts                    |
| .....Decision feedback equalizers        | .....Video coding                        |
| .....Filtering theory                    |  |





- .....Global warming
- .....Ecology
- .....Ecosystems
- .....Wetlands
- .....Environmental economics
- .....Carbon tax
- .....Emissions trading
- .....Environmental monitoring
- .....Global warming
- .....Green manufacturing
- .....Green products
- .....Green buildings
- .....Green cleaning
- .....Green transportation
- .....Pollution
- .....Air pollution
- .....Emissions trading
- .....Industrial pollution
- .....Land pollution
- .....Oil pollution
- .....Radioactive pollution
- .....Thermal pollution
- .....Urban pollution
- .....Water pollution
- ....Ethical aspects
- ....Ethics
- .....Cyberethics
- .....Machine ethics
- ....Globalization
- ....International relations
- ....Peace technology
- ....Philosophical considerations
- ....Social factors
- .....Demography
- .....Developing countries
- .....Technology social factors
- .....Privacy
- ....Sustainable development
- ....Technology
- .....Appropriate technology
- .....Disruptive technologies
- .....Machine ethics
- .....Neurotechnology
- .....Technological innovation
- .....Technology social factors
- .....Privacy
- .....Technology transfer
- .....Small business technology transfer
- .....Telepresence
- .....Telexistence

## Solid state circuits

- ....Circuit subsystems
- ....Circuit theory
- ....FET circuits
- .....FET integrated circuits
- .....Field effect MMIC
- .....MESFET integrated circuits
- .....JFET circuits
- .....JFET integrated circuits
- .....MESFET circuits
- .....MESFET integrated circuits
- .....MODFET circuits
- .....MODFET integrated circuits
- .....MOSFET circuits
- .....CMOSFET circuits
- .....MOS integrated circuits
- .....Power MOSFET
- ....Gate leakage
- ....Solid state circuit design
- ....Transistors
- .....Field effect transistors
- .....CNTFETs
- .....Double-gate FETs
- .....FeFETs
- .....HEMTs
- .....JFETs
- .....MESFETs
- .....MISFETs
- .....MODFETs
- .....MOSFET
- .....MOSHFETs
- .....OFETs
- .....Schottky gate field effect transistors
- .....TFETs
- .....Thin film transistors
- .....Heterojunction bipolar transistors
- .....Double heterojunction bipolar transistors
- .....Millimeter wave transistors
- .....Phototransistors
- .....Static induction transistors

## Superconductivity

- ....Bean model
- ....Critical current density (superconductivity)
- .....Critical current density
- ....Flux pinning
- ....Superconducting devices





- .....Josephson junctions
- .....SQUIDs
- .....Superconducting coils
- .....Superconducting magnets
- .....Superconducting microwave devices
- .....Superconducting photodetectors
- ....Superconducting filaments and wires
- ....Superconducting films
- .....Superconducting thin films
- ....Superconducting integrated circuits
- ....Superconducting magnetic energy storage
- ....Superconducting materials
- .....Granular superconductors
- .....High-temperature superconductors
- .....Yttrium barium copper oxide
- .....Multifilamentary superconductors
- .....Niobium-tin
- .....Type II superconductors
- ....Superconducting transition temperature
- ....Superconductive tunneling

### **Systems engineering and theory**

- ....Adaptive systems
- .....Adaptive control
- .....Cognitive radar
- .....Line enhancers
- .....Multi-agent systems
- .....Collaborative intelligence
- .....Variable structure systems
- ....Capability engineering
- ....Complex systems
- ....Configuration management
- ....Hierarchical systems
- .....Multilevel systems
- ....Integrated design
- ....Interface management
- ....Modeling
- .....Analytical models
- .....Common Information Model (computing)
- .....Atmospheric modeling
- .....Brain modeling
- .....Building information management
- .....Computational modeling
- .....Agent-based modeling
- .....Computational cultural modeling
- .....Reversible computing
- .....Context modeling
- .....Data models

- .....Data-driven modeling
- .....Metadata
- .....Data-driven modeling
- .....Deformable models
- .....Digital elevation models
- .....Emulation
- .....Graphical models
- .....Green's function methods
- .....Hidden Markov models
- .....Input variables
- .....Integrated circuit modeling
- .....Cutoff frequency
- .....Inverse problems
- .....Deconvolution
- .....Load modeling
- .....Metamodeling
- .....Numerical models
- .....Object oriented modeling
- .....Power system modeling
- .....Load modeling
- .....Process modeling
- .....Semiconductor device modeling
- .....Semiconductor process modeling
- .....Signal representation
- .....Simulation
- .....Computer simulation
- .....Digital simulation
- .....Hardware-in-the-loop simulation
- .....Human in the loop
- .....Medical simulation
- .....Mixed reality
- .....Quantum simulation
- .....Serious games
- .....Systems simulation
- .....Solid modeling
- .....System identification
- .....Systems modeling
- ....Multidimensional systems
- ....Network systems
- .....DC distribution systems
- ....Physical design
- ....Reduced order systems
- ....Requirements engineering
- .....Technical requirements
- ....Requirements management
- ....Service-oriented systems engineering
- ....Solution design
- ....Stochastic systems
- ....System analysis and design
- .....Asymptotic stability
- .....Control system analysis



- .....State-space methods
- .....Diakoptics
- .....Distributed processing
- .....Dew computing
- .....Edge computing
- .....Message passing
- .....Distributed vision networks
- .....Fault detection
- .....Fault tolerant systems
- .....Interconnected systems
- .....Botnet
- .....Large-scale systems
- .....Lyapunov methods
- .....Open systems
- .....Open Access
- .....Open Educational Resources
- .....Physical layer
- .....Petri nets
- .....Physical design
- .....Robust control
- .....Scalability
- .....Scattering parameters
- .....Sequential analysis
- .....Zero correlation zone
- .....Sequential diagnosis
- .....Software prototyping
- .....Static analysis
- .....System dynamics
- .....System performance
- .....Cooperative caching
- .....System-level design
- .....Systems modeling
- .....Systems Modeling Language
- .....Task analysis
- .....Time factors
- .....Continuous time systems
- .....Discrete-time systems
- .....Time invariant systems
- .....Time-varying systems
- ....System implementation
- ....System improvement
- ....System integration
- ....System of systems
- .....Cyber-physical systems
- .....Digital twin
- ....System realization
- ....System validation
- ....System testing
- .....Model checking
- ....System verification
- .....System testing

- .....Model checking
- ....Systems architecture
- .....Deep architecture
- .....Deep learning
- ....Systems engineering education
- ....Systems operation
- ....Systems simulation
- ....Systems support
- ....Systems thinking
- ....Task analysis
- ....Technical management
- .....Maintenance management
- .....Technical planning

### **Systems, man, and cybernetics**

- ....Behavioral sciences
- .....Animal behavior
- .....Cognition
- .....Activity recognition
- .....Cognitive neuroscience
- .....Cognitive processes
- .....Self-aware
- .....Consumer behavior
- .....Psychiatry
- .....Mental disorders
- .....Psychology
- .....Active perception
- .....Emotional responses
- .....Industrial psychology
- .....Mental health
- .....Mood
- .....Neuropsychology
- .....Psychometric testing
- .....Social intelligence
- ....Biological control systems
- .....Biomarkers
- .....Molecular biomarkers
- ....Computational linguistics
- .....Machine translation
- .....Sentiment analysis
- ....Cybernetics
- .....Adaptive systems
- .....Adaptive control
- .....Cognitive radar
- .....Line enhancers
- .....Multi-agent systems
- .....Variable structure systems
- .....Cognitive informatics
- .....Cognitive science
- .....Human intelligence



.....Problem-solving  
 .....Control theory  
 .....Control nonlinearities  
 .....Iterative learning control  
 .....Observability  
 .....Decision theory  
 .....Decision trees  
 .....TOPSIS  
 .....Econophysics  
 .....Emergent phenomena  
 .....Intelligent control  
 .....Feedforward systems  
 .....Neurocontrollers  
 .....Linear feedback control systems  
 .....Frequency locked loops  
 .....Phase locked loops  
 .....State feedback  
 .....Tracking loops  
 ....Ergonomics  
 .....Job design  
 .....Smart spaces  
 .....User experience  
 ....Human factors  
 .....Anthropomorphism  
 .....Human image synthesis  
 .....Human intelligence  
 .....Digital intelligence  
 .....Mental health  
 .....Technology acceptance model  
 ....Identification of persons  
 .....Biometrics (access control)  
 .....Face recognition  
 .....Fingerprint recognition  
 .....Gait recognition  
 .....Iris recognition  
 .....Keystroke dynamics  
 .....Palmprint recognition  
 .....Face recognition  
 .....Fingerprint recognition  
 .....Handwriting recognition  
 .....Forgery  
 .....Speaker recognition  
 .....Speech recognition  
 .....Automatic speech recognition  
 .....Speech analysis  
 ....Man-machine systems  
 .....Digital intelligence  
 .....Extended reality  
 .....Interactive systems  
 .....External stimuli  
 ....Natural languages

.....Linguistics  
 .....Phonetics  
 .....Pragmatics  
 .....Natural language processing  
 .....Chatbot  
 .....Machine translation  
 .....Morphology  
 .....Sentiment analysis  
 .....Tokenization  
 ....Pervasive computing  
 .....Ubiquitous computing  
 .....Context-aware services  
 .....Wearable computers  
 .....Smart glasses  
 ....Posthuman  
 ....Teleworking  
 ....Transhuman  
 ....User interfaces  
 .....Audio user interfaces  
 .....Brain-computer interfaces  
 .....Data visualization  
 .....Isosurfaces  
 .....Emotion recognition  
 .....Exoskeletons  
 .....Graphical user interfaces  
 .....Avatars  
 .....Human computer interaction  
 .....Affective computing  
 .....Chatbot  
 .....Extended reality  
 .....Gaze tracking  
 .....Head-mounted displays  
 .....Head-up displays  
 .....Human in the loop  
 .....Immersive experience  
 .....Telepresence  
 .....Telexistence  
 .....Human-robot interaction  
 .....Human-vehicle systems  
 .....Smart cards

### **Ultrasonics, ferroelectrics, and frequency control**

....Ferroelectric materials  
 .....Ferroelectric films  
 .....Relaxor ferroelectrics  
 ....Frequency control  
 .....Automatic frequency control  
 .....Tunable circuits and devices  
 .....RLC circuits



- .....Tuned circuits
- .....Tuning
- .....Laser tuning
- .....Optical tuning
- .....Tuners
- ...Piezoelectricity
- .....Piezoelectric effect
- .....Piezoelectric polarization
- ...Pyroelectricity
- ...Ultrasonic imaging
- .....Ultrasonography
- .....Sonogram
- ...Ultrasonic transducers

### **Vehicular and wireless technologies**

- ...Automotive engineering
- .....Automotive applications
- .....Automotive electronics
- .....Power steering
- .....Vehicle crash testing
- .....Vehicle detection
- .....Vehicle driving
- .....Vehicle dynamics
- .....Rollover
- .....Vehicle safety
- .....Advanced driver assistance systems
- .....Lane departure warning systems
- .....Lane detection
- ...Land mobile radio equipment
- .....Mobile antennas
- ...Navigation
- .....Aircraft navigation
- .....Course correction
- .....Dead reckoning
- .....Indoor navigation
- .....Inertial navigation
- .....Marine navigation
- .....Radio navigation
- .....Satellite navigation systems
- .....Global navigation satellite system
- .....Global Positioning System
- .....Satellite constellations
- .....Sonar navigation
- ...Propulsion
- .....Aerospace propulsion
- .....Aircraft propulsion
- .....Propellers
- .....Electromagnetic launching
- .....Coilguns

- .....Railguns
- .....Electrothermal launching
- .....Rockets
- ...Vehicles
- .....Connected vehicles
- .....Hydrogen powered vehicles
- .....Intelligent vehicles
- .....Autonomous vehicles
- .....Unmanned vehicles
- .....Vehicle-to-everything
- .....Land vehicles
- .....Bicycles
- .....Electric vehicles
- .....Road vehicles
- .....Military vehicles
- .....Space vehicles
- .....Space shuttles
- ...Wireless sensor networks
- .....Body sensor networks
- .....Event detection

