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# 2020 IEEE Taxonomy

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**Created by  
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of Electrical  
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 2020 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
.....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
....Sonar	....Sonar
....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 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
  - .....Active circuits



.....Active inductors	.....Analog-digital integrated circuits
.....Gyrators	.....Application specific integrated circuits
.....Operational amplifiers	.....CMOS integrated circuits
.....Adders	.....Coproductors
.....Analog circuits	.....Current-mode circuits
.....Analog integrated circuits	.....Digital integrated circuits
.....Analog processing circuits	.....FET integrated circuits
.....Application specific integrated circuits	.....Field programmable gate arrays
.....System-on-chip	.....Hybrid integrated circuits
.....Asynchronous circuits	.....Integrated circuit interconnections
.....Bipolar transistor circuits	.....Integrated circuit modeling
.....BiCMOS integrated circuits	.....Integrated circuit noise
.....Bipolar integrated circuits	.....Integrated circuit synthesis
.....Bistable circuits	.....Large scale integration
.....Latches	.....MESFET integrated circuits
.....Bridge circuits	.....Microprocessors
.....Charge pumps	.....Microwave integrated circuits
.....Circuit analysis	.....Millimeter wave integrated circuits
.....Circuit analysis computing	.....Monolithic integrated circuits
.....Coupled mode analysis	.....Photonic integrated circuits
.....Nonlinear network analysis	.....Power integrated circuits
.....Circuit faults	.....Radiofrequency integrated circuits
.....Electrical fault detection	.....Submillimeter wave integrated circuits
.....Circuit noise	.....Superconducting integrated circuits
.....Thermal noise	.....Thick film circuits
.....Circuit simulation	.....Thin film circuits
.....Circuit synthesis	.....Three-dimensional integrated circuits
.....High level synthesis	.....Through-silicon vias
.....Integrated circuit synthesis	.....UHF integrated circuits
.....Coproductors	.....Ultra large scale integration
.....Counting circuits	.....Very high speed integrated circuits
.....Coupling circuits	.....Very large scale integration
.....Digital circuits	.....Wafer scale integration
.....Circuit topology	.....Isolators
.....Digital integrated circuits	.....Large scale integration
.....Digital signal processors	.....Ultra large scale integration
.....Distributed parameter circuits	.....Very large scale integration
.....Driver circuits	.....Wafer scale integration
.....Electronic circuits	.....Linear circuits
.....Breadboard	.....Logic arrays
.....Central Processing Unit	.....Programmable logic arrays
.....Multivibrators	.....Logic circuits
.....Stripboard circuit	.....Combinational circuits
.....Equivalent circuits	.....Logic arrays
.....Feedback	.....Programmable logic arrays
.....Feedback circuits	.....Superconducting logic circuits
.....Negative feedback	.....Magnetic circuits
.....Neurofeedback	.....Microprocessors
.....Hybrid integrated circuits	
.....Integrated circuits	
.....Analog integrated 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
.....Radiation detector circuits	.....Digital filters
.....Rail to rail operation	.....Equalizers
.....Rail to rail amplifiers	.....Filtering theory
.....Rail to rail inputs	.....Gabor filters
.....Rail to rail outputs	.....Harmonic filters
.....Rectifiers	.....IIR filters
.....RLC circuits	.....Kalman filters
.....Sampled data circuits	.....Low-pass filters
.....Sequential circuits	.....Matched filters
.....Silicon-on-insulator	.....Microstrip filters
.....Silicon on sapphire	.....Nonlinear filters
.....Submillimeter wave circuits	.....Notch filters



- .....Particle filters
- .....Power filters
- .....Resonator filters
- .....Spatial filters
- .....Superconducting filters
- .....Transversal filters
- .....Information filtering
- .....Information filters
- .....Recommender systems
- ....Integrated circuit technology
- .....Beyond CMOS
- .....CMOS technology
- .....CMOS process
- .....Silicon on sapphire
- .....Moore's Law
- ....Logic devices
- .....Logic gates
- .....Programmable logic devices
- ....Oscillators
- .....Digital-controlled oscillators
- .....Injection-locked oscillators
- .....Local oscillators
- .....Microwave oscillators
- .....Phase noise
- .....Ring oscillators
- .....Voltage-controlled oscillators
- ....Single electron devices
- .....Single electron memory
- .....Hetero-nanocrystal memory
- .....Single electron transistors
- ....Tunable circuits and devices
- .....RLC circuits
- .....Tuned circuits

**Communications technology**

- ....Communication equipment
- .....Auditory displays
- .....Codecs
- .....Speech codecs
- .....Video codecs
- .....Modems
- .....On board unit
- .....Optical communication equipment
- .....Optical transmitters
- .....Radio communication equipment
- .....Base stations
- .....Ham radios
- .....Land mobile radio equipment
- .....Radio transceivers
- .....Transponders

- .....Receivers
- .....Optical receivers
- .....RAKE receivers
- .....Receiving antennas
- .....Repeaters
- .....Speech codecs
- .....Telephone equipment
- .....Cellular phones
- .....Landline
- .....Telephone sets
- .....Vocoders
- .....Transceivers
- .....Radio transceivers
- .....Transmitters
- .....Auxiliary transmitters
- .....Diversity methods
- .....Neurotransmitters
- .....Optical transmitters
- .....Radio transmitters
- .....Transmitting antennas
- .....Transponders
- .....TV equipment
- .....Large screen displays
- .....TV receivers
- .....Video codecs
- .....Video equipment
- .....Optical projectors
- .....Video codecs
- .....Videos
- .....Vocoders
- ....Communication switching
- .....Code division multiplexing
- .....Electronic switching systems
- .....Frame relay
- .....Handover
- .....Multiprotocol label switching
- .....Packet switching
- .....Burst switching
- .....Frame relay
- .....Multiprotocol label switching
- .....Packet loss
- ....Communication systems
- .....ARPANET
- .....Biomedical communication
- .....Biomedical telemetry
- .....Telemedicine
- .....Broadband communication
- .....B-ISDN
- .....Broadband amplifiers
- .....Communication networks
- .....Central office



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



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





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



- .....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
- .....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
- .....Expert systems
- .....Mobile agents
- .....Knowledge engineering
- .....Inference mechanisms
- .....Knowledge acquisition
- .....Knowledge discovery
- .....Knowledge representation
- .....Learning (artificial intelligence)
- .....Distance learning
- .....Electronic learning
- .....Nearest neighbor methods
- .....Learning systems
- .....Backpropagation
- .....Cognitive systems
- .....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
- .....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

### Computational and artificial intelligence

- ....Artificial intelligence
- .....Affective computing
- .....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



.....Fuzzy cognitive maps  
 .....Takagi-Sugeno model  
 .....Multivalued logic  
 .....Probabilistic logic  
 .....Sufficient conditions  
 ....Machine intelligence  
 .....Pattern analysis  
 ....Neural networks  
 .....Artificial neural networks  
 .....Convolutional neural networks  
 .....Hebbian theory  
 .....Self-organizing feature maps  
 .....Biological neural networks  
 .....Cellular neural networks  
 .....Feedforward neural networks  
 .....Multilayer perceptrons  
 .....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 enterprises  
 .....Virtual manufacturing  
 .....Virtual machining  
 .....Web sites  
 .....Facebook  
 .....MySpace  
 .....Uniform resource locators  
 .....Web design  
 .....YouTube  
 .....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  
 .....Dynamic voltage scaling  
 .....Memory architecture  
 .....Memory management  
 .....Multiprocessor interconnection  
 .....Hypercubes  
 .....Parallel architectures  
 .....Multicore processing  
 .....Reconfigurable architectures  
 ....Computer interfaces  
 .....Application programming interfaces  
 .....Restful API  
 .....WebRTC  
 .....Browsers  
 .....Computer ports



.....Field buses	.....Web 2.0
.....Firewire	.....Web services
.....Haptic interfaces	.....Intserv networks
.....Data gloves	.....IP networks
.....Force feedback	.....TCPIP
.....Grasping	.....Metropolitan area networks
.....Tactile Internet	.....Multiprocessor interconnection networks
.....Hypertext systems	.....Network function virtualization
.....Input devices	.....Cloud radio access networks
.....Interface phenomena	.....Network security
.....Network interfaces	.....Network reconnaissance
.....Interface states	.....Network servers
.....Musical instrument digital interfaces	.....Next generation networking
.....System buses	.....Overlay networks
...Computer networks	.....Peer-to-peer computing
.....Ad hoc networks	.....Software defined networking
.....AODV	.....Storage area networks
.....Mesh networks	.....Token networks
.....Mobile ad hoc networks	.....Unicast
.....Vehicular ad hoc networks	.....Virtual private networks
.....Computer network management	.....Extranets
.....Computer network reliability	.....Wide area networks
.....Disruption tolerant networking	.....Wireless access points
.....Management information base	...Computer performance
.....Middleboxes	.....Computer errors
.....Network address translation	.....Computer crashes
.....Network synthesis	.....Hardware acceleration
.....Content distribution networks	.....Performance loss
.....Cyberspace	...Computer peripherals
.....Diffserv networks	.....Disk drives
.....Domain Name System	.....Keyboards
.....Ethernet	.....Modems
.....Energy efficient ethernet	.....Printers
.....EPON	.....Laser printers
.....Google	...Computer science
.....Heterogeneous networks	.....Computational neuroscience
.....Internet	.....Formal languages
.....Bot (Internet)	.....Computer languages
.....Botnet	.....Runtime library
.....Cloud computing	.....Network theory (graphs)
.....Crowdsourcing	.....Programming
.....Energy Internet	.....Augmented reality
.....Instant messaging	.....Automatic programming
.....Internet of Things	.....Concatenated codes
.....Internet security	.....Functional programming
.....Internet telephony	.....Granular computing
.....Internet topology	.....Integer linear programming
.....Linked data	.....Logic programming
.....Middleboxes	.....Microprogramming
.....Semantic Web	.....Object oriented methods
.....Social computing	



.....Object oriented programming	....Concurrency control
.....Opportunistic software systems	.....Processor scheduling
development	.....Scheduling algorithms
.....Parallel programming	....Data systems
.....Performance analysis	.....Data acquisition
.....Programming profession	.....Fastbus
.....Robot programming	.....User-generated content
....Computer security	.....Data centers
.....Application security	.....Data center power
.....Authentication	.....Data compression
.....Multi-factor authentication	.....Adaptive coding
.....Cloud computing security	.....Audio compression
.....Computer crime	.....Huffman coding
.....Counterfeiting	.....Source coding
.....Cyber terrorism	.....Test data compression
.....Cyberattack	.....Transform coding
.....SQL injection	.....Data conversion
.....Computer hacking	.....Analog-digital conversion
.....Countermeasures (computer)	.....Digital-analog conversion
.....Cross-site scripting	.....Data engineering
.....Cyber espionage	.....Data handling
.....Cyber warfare	.....Data assimilation
.....Cyberattack	.....Data dissemination
.....Data integrity	.....Data encapsulation
.....Denial-of-service attack	.....Data integrity
.....Distributed denial-of-service attack	.....Document handling
.....Firewalls (computing)	.....Merging
.....Honey pot (computing)	.....Sorting
.....Identity management systems	.....Data processing
.....Internet security	.....Associative processing
.....Mobile security	.....Business data processing
.....Password	.....Data analysis
.....Penetration testing	.....Data collection
.....Permission	.....Data integration
.....Phishing	.....Data preprocessing
.....Proof of work	.....Data transfer
....Computers	.....Information exchange
.....Analog computers	.....Spreadsheet programs
.....Calculators	.....Text processing
.....Difference engines	.....Virtual enterprises
.....Digital computers	.....Data storage systems
.....Mainframes	.....Triples (Data structure)
.....Microcomputers	.....Data warehouses
.....Portable computers	....Database machines
.....Workstations	....Digital systems
.....Parallel machines	.....Digital preservation
.....Supercomputers	.....Digital storage
.....Exascale computing	.....Solid state drives
.....Tablet computers	.....Digital transformation
.....Wearable computers	.....Internet
.....Smart glasses	.....Bot (Internet)



.....Botnet	.....Social computing
.....Cloud computing	.....Web 2.0
.....Crowdsourcing	.....Web services
.....Energy Internet	.....Metacomputing
.....Instant messaging	.....Grid computing
.....Internet of Things	.....Peer-to-peer computing
.....Internet security	....DNA computing
.....Internet telephony	....File servers
.....Internet topology	....Hardware
.....Linked data	.....Hardware acceleration
.....Middleboxes	.....Input devices
.....Semantic Web	.....Open source hardware
.....Social computing	.....Reconfigurable devices
.....Web 2.0	.....Wireless access points
.....Web services	....High performance computing
.....ISDN	.....Exascale computing
.....B-ISDN	....Image processing
.....Local area networks	.....Active shape model
.....Wireless LAN	.....Blob detection
.....Metropolitan area networks	.....Corner detection
.....Token networks	.....Feature detection
.....Virtual artifact	.....Feature extraction
....Distributed computing	.....Fiducial markers
.....Client-server systems	.....Geophysical image processing
.....Middleware	.....Gray-scale
.....Servers	.....Image analysis
.....Cluster computing	.....Image classification
.....Collaborative work	.....Image motion analysis
.....Collaborative intelligence	.....Image quality
.....Cooperative communication	.....Image sequence analysis
.....Crowdsourcing	.....Image texture analysis
.....Social computing	.....Object detection
.....Diffserv networks	.....Subtraction techniques
.....Distributed databases	.....Image annotation
.....Distributed information systems	.....Image capture
.....Distributed management	.....Image coding
.....Publish-subscribe	.....Image color analysis
.....Internet	.....Image decomposition
.....Bot (Internet)	.....Image denoising
.....Botnet	.....Image enhancement
.....Cloud computing	.....Image filtering
.....Crowdsourcing	.....Image fusion
.....Energy Internet	.....Image recognition
.....Instant messaging	.....Image edge detection
.....Internet of Things	.....Image reconstruction
.....Internet security	.....Image registration
.....Internet telephony	.....Image representation
.....Internet topology	.....Digital representation
.....Linked data	.....Image resolution
.....Middleboxes	.....High-resolution imaging
.....Semantic Web	.....Spatial resolution



- .....Superresolution
- .....Image restoration
- .....Image sampling
- .....Image segmentation
- .....Image segmentaton
- .....Thresholding (Imaging)
- .....Image sequences
- .....Image synthesis
- .....Human image synthesis
- .....Image texture
- .....Machine vision
- .....Object recognition
- .....Object segmentation
- .....Morphological operations
- .....Optical feedback
- .....Saliency detection
- .....Smart pixels
- .....Spatial coherence
- .....Structure from motion
- .....Table lookup
- ....Memory
- .....Analog memory
- .....Associative memory
- .....Buffer storage
- .....Computer buffers
- .....Cache memory
- .....Cache storage
- .....Content addressable storage
- .....Flash memories
- .....Flash memory cells
- .....Magnetic memory
- .....Floppy disks
- .....Hard disks
- .....Memory management
- .....Nonvolatile memory
- .....Nonvolatile single electron memory
- .....Phase change memory
- .....Phase change random access memory
- .....Random access memory
- .....DRAM chips
- .....Phase change random access memory
- .....Resistive RAM
- .....SDRAM
- .....SRAM cells
- .....SRAM chips
- .....Read only memory
- .....PROM
- .....Read-write memory
- .....Registers
- .....Shift registers
- .....Scanning probe data storage
- .....Semiconductor memory
- .....Integrated memory circuits
- ....Mobile computing
- .....Wireless access points
- ....Molecular computing
- ....Multitasking
- .....Parametric study
- ....Open systems
- .....Open Access
- .....Public domain software
- .....Open Educational Resources
- .....Physical layer
- .....Physical layer security
- ....Optical computing
- ....Parallel processing
- .....Multiprocessing systems
- .....Data flow computing
- .....Processor scheduling
- .....Systolic arrays
- .....Multithreading
- .....Parallel algorithms
- .....Pipeline processing
- ....Pattern recognition
- .....Active shape model
- .....Activity recognition
- .....Character recognition
- .....Clustering methods
- .....Pattern clustering
- .....Data mining
- .....Anomaly detection
- .....Association rules
- .....Data privacy
- .....Text analysis
- .....Text mining
- .....Web mining
- .....Face recognition
- .....Fingerprint recognition
- .....Gesture recognition
- .....Sign language
- .....Handwriting recognition
- .....Forgery
- .....Nearest neighbor methods
- .....Pattern matching
- .....Image matching
- .....Speech recognition
- .....Automatic speech recognition
- .....Speech analysis
- .....Text recognition
- ....Pervasive computing





- .....Ubiquitous computing
- .....Context-aware services
- .....Wearable computers
- .....Smart glasses
- ....Petascale computing
- ....Platform virtualization
- ....Probabilistic computing
- ....Probability computing
- ....Quantum computing
- .....Quantum cellular automata
- .....Qubit
- ....Real-time systems
- .....Telexistence
- .....WebRTC
- ....Software
- .....Anti-virus software
- .....Application software
- .....Embedded software
- .....Malware
- .....Computer viruses
- .....Computer worms
- .....Ransomware
- .....Rootkit
- .....Trojan horses
- .....Middleware
- .....Mediation
- .....Message-oriented middleware
- .....Web services
- .....Open source software
- .....Optical character recognition software
- .....Privacy-invasive software
- .....Spyware
- .....Public domain software
- .....Python
- .....R language
- .....Software agents
- .....Agent-based modeling
- .....Autonomous agents
- .....Botnet
- .....Intelligent agents
- .....Software as a service
- .....Software debugging
- .....Software design
- .....Software maintenance
- .....Software packages
- .....EMTDC
- .....PSCAD
- .....SPICE
- .....Software performance
- .....Software quality
- .....Software reusability
- .....Software safety
- .....Software systems
- .....Software tools
- .....Authoring systems
- .....System software
- .....File systems
- .....Operating systems
- .....Program processors
- .....Utility programs
- ....Software engineering
- .....Capability maturity model
- .....Computer aided software engineering
- .....Formal verification
- .....Programming environments
- .....Reasoning about programs
- .....Release engineering
- .....Runtime
- .....Dynamic compiler
- .....Runtime environment
- .....Software architecture
- .....Client-server systems
- .....Dew computing
- .....Microarchitecture
- .....Representational state transfer
- .....Restful API
- .....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
- .....Multimedia computing
- .....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
- .....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
- .....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



- ....Education 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
  - .....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

### 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
- .....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 cellular automata
- .....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
- .....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
- ....Chemical engineering
- ....Civil engineering
  - .....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)
- ....Morphogenetic engineering
- ....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
    - .....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
      - .....Gene therapy
      - .....Genetic communication
      - .....Genetic expression
      - .....Genetic programming
    - .....Genomics
  - .....Homeostasis
  - .....Mechanobiology
  - .....Microbiology
    - .....Electroporation
    - .....Microinjection
  - .....Nanobioscience
    - .....DNA computing
    - .....Nanobiotechnology
  - .....Physiology
    - .....Action potentials
    - .....External stimuli
    - .....Neuromodulation
    - .....Predator prey systems
  - .....Synthetic biology
  - .....Systematics
  - .....Systems biology
  - .....Vegetation
    - .....Crops
    - .....Marine vegetation
  - .....Zoology
    - .....Animals
- ....Biomedical communication
  - .....Biomedical telemetry
  - .....Telemedicine
- ....Biomedical computing
  - .....Bioinformatics
    - .....Neuroinformatics
  - .....Medical expert systems



.....Medical information systems  
 .....Electronic medical records  
 ....Biomedical engineering  
 .....Bioimpedance  
 .....Biological techniques  
 .....Biomedical applications of radiation  
 .....Biomedical electronics  
 .....Biomedical signal processing  
 .....Biomedical image processing  
 .....Biotechnology  
 .....Cloning  
 .....Drug delivery  
 .....Targeted drug delivery  
 .....Neural engineering  
 .....Neural circuits  
 .....Neural microtechnology  
 .....Neural nanotechnology  
 .....Neural prosthesis  
 .....Protein engineering  
 .....Tissue engineering  
 .....Regeneration engineering  
 .....Translational research  
 ....Biomedical equipment  
 .....Assistive technology  
 .....Assistive devices  
 .....Closed captioning  
 .....Video description  
 .....Wheelchairs  
 .....Biomedical electrodes  
 .....Biomedical telemetry  
 .....Biomedical transducers  
 .....Catheters  
 .....Cybercare  
 .....Endoscopes  
 .....Endomicroscopy  
 .....Gerontechnology  
 .....Hypodermic needles  
 .....Implants  
 .....Auditory implants  
 .....Brainstem implants  
 .....Cochlear implants  
 .....Microelectronic implants  
 .....Neural implants  
 .....Intracranial pressure sensors  
 .....Lithotriptors  
 .....Medical devices  
 .....Medical instruments  
 .....Pacemakers  
 .....Pulse oximeter  
 .....Stethoscope  
 .....Surgical instruments  
 .....Laparoscopes  
 ....Biomedical imaging  
 .....Angiocardiology  
 .....Angiography  
 .....Biomedical optical imaging  
 .....Cardiology  
 .....Echocardiography  
 .....Electrocardiography  
 .....Phonocardiography  
 .....DICOM  
 .....Elastography  
 .....Encephalography  
 .....Mammography  
 .....Medical diagnostic imaging  
 .....Anatomical structure  
 .....Molecular imaging  
 .....Phantoms  
 .....Photoacoustic imaging  
 ....Bionanotechnology  
 ....Bioterrorism  
 ....Computational biology  
 .....Computational biochemistry  
 .....Computational biophysics  
 .....Computational systems biology  
 ....Genetic engineering  
 ....Medical services  
 .....Assisted living  
 .....Ambient assisted living  
 .....Catheterization  
 .....Clinical diagnosis  
 .....Clinical neuroscience  
 .....Cybercare  
 .....Electronic healthcare  
 .....Health information management  
 .....Hospitals  
 .....In vitro  
 .....In vitro fertilization  
 .....In vivo  
 .....Medical conditions  
 .....Aneurysm  
 .....Atrophy  
 .....Autism  
 .....Blindness  
 .....Cataracts  
 .....Deafness  
 .....Depression  
 .....Diabetes  
 .....Diseases  
 .....Hemorrhaging  
 .....Hypertension  
 .....Hyperthermia





.....Injuries	.....Patient rehabilitation
.....Kidney stones	.....Pharmaceuticals
.....Obesity	.....Precision medicine
.....Paralysis	.....Proton therapy
.....Pregnancy	.....Surgery
.....Sleep apnea	.....Occupational medicine
.....Stroke (medical condition)	.....Point of care
.....Thrombosis	.....Prosthetics
.....Tumors	.....Artificial biological organs
.....Medical diagnosis	.....Artificial limbs
.....Autopsy	.....Prosthetic hand
.....Bronchoscopy	.....Prosthetic limbs
.....Colonography	.....Visual prosthesis
.....Computer aided diagnosis	.....Public healthcare
.....Medical signal detection	.....Sensory aids
.....Nanomedicine	.....Hearing aids
.....Plethysmography	.....Smart healthcare
.....Sensitivity and specificity	.....Vaccines
.....Medical tests	.....X-rays
.....Amniocentesis	.....X-ray applications
.....Biopsy	.....X-ray detection
.....Cancer detection	.....X-ray scattering
.....Colonoscopy	.....X-ray tomography
.....Pregnancy test	...Medical specialties
.....Medical treatment	.....Anesthesiology
.....Anesthesia	.....Cardiology
.....Angioplasty	.....Cardiac tissue
.....Brachytherapy	.....Dermatology
.....Brain stimulation	.....Gastroenterology
.....Cancer treatment	.....Gerontology
.....Chemotherapy	.....Gerontechnology
.....Clinical trials	.....Gynecology
.....Cryotherapy	.....Neonatology
.....Defibrillation	.....Neurology
.....Dentistry	.....Oncology
.....Electrical stimulation	.....Pathology
.....Electronic medical prescriptions	.....Neuropathology
.....Electroporation	.....Pathological processes
.....Embolization	.....Pediatrics
.....Fibrillation	...Nuclear medicine
.....Geriatrics	...Synthetic biology
.....Hepatectomy	
.....Hospitals	<b>Engineering management</b>
.....Hyperthermia	...Business
.....Lithotripsy	.....Business data processing
.....Magnetic stimulation	.....Business intelligence
.....Neuromuscular stimulation	.....Disruptive innovation
.....Neutron capture therapy	.....Entrepreneurship
.....Noninvasive treatment	.....Franchising
.....Orthopedic procedures	.....Industrial relations
.....Orthotics	



.....Management	.....Companies
.....Asset management	.....Government
.....Best practices	.....Sociotechnical systems
.....Business continuity	.....United Kingdom Space Agency
.....Business process management	....Commercialization
.....Business process re-engineering	....Consortia
.....Communication system operations and management	....Economics
.....Conference management	.....Access charges
.....Content management	.....Costs
.....Contingency management	.....Cost benefit analysis
.....Contract management	.....Developing countries
.....Contracts	.....Econometrics
.....Customer relationship management	.....Economic forecasting
.....Decision making	.....Economic indicators
.....Dependability management	.....Share prices
.....Distributed management	.....Electronic commerce
.....Enterprise resource planning	.....Environmental economics
.....Facilities management	.....Carbon tax
.....Financial management	.....Emissions trading
.....Governmental factors	.....Exchange rates
.....Human resource management	.....Fuel economy
.....Information management	.....International trade
.....Interface management	.....Macroeconomics
.....International collaboration	.....Privatization
.....Knowledge management	.....Microeconomics
.....Marketing management	.....Economies of scale
.....Organizational aspects	.....Industrial economics
.....Outsourcing	.....Monopoly
.....Process planning	.....Oligopoly
.....Production management	.....Power generation economics
.....Program management	.....Electricity supply industry deregulation
.....Project management	.....Profitability
.....Public relations	.....Sharing economy
.....Quality management	.....Stock markets
.....Requirements management	.....Supply and demand
.....Research and development management	.....Trade agreements
.....Resource management	.....Venture capital
.....Risk analysis	.....Virtual enterprises
.....Safety management	....Innovation management
.....Security management	.....Creativity
.....Storage management	....Legal factors
.....Supply chain management	.....Copyright protection
.....Technical management	.....Intellectual property
.....Technology management	.....Software protection
.....Operations research	.....Law
.....Inventory control	.....Censorship
.....Virtual enterprises	.....Commercial law
.....Organizations	.....Consumer protection
.....BNSC	.....Contract law
	.....Criminal law



.....Employment law	.....Ecosystems
.....Forensics	.....Wetlands
.....Law enforcement	.....Environmental economics
.....Patent law	.....Carbon tax
.....Trademarks	.....Emissions trading
.....Patents	.....Environmental monitoring
.....Product liability	.....Global warming
.....Warranties	.....Green manufacturing
.....Software protection	.....Green products
.....Trademarks	.....Green buildings
....Market research	.....Green cleaning
....Planning	.....Green transportation
.....Meeting planning	.....Pollution
.....Schedules	.....Air pollution
.....Strategic planning	.....Emissions trading
.....Roadmaps (technology planning)	.....Industrial pollution
.....Technical planning	.....Land pollution
.....Technology planning	.....Oil pollution
....Product development	.....Radioactive pollution
.....Graphical user interfaces	.....Thermal pollution
.....Avatars	.....Urban pollution
.....Product customization	.....Water pollution
.....Product lifecycle management	...Geographic information systems
.....Prognostics and health management	.....Geospatial analysis
.....Software product lines	.....Gunshot detection systems
.....Time to market	...Geophysical measurement techniques
....Project engineering	.....Geophysical image processing
.....Scheduling	...Geophysical measurements
.....Adaptive scheduling	.....Geodesy
.....Dynamic scheduling	.....Level measurement
.....Job shop scheduling	.....Sea measurements
.....Single machine scheduling	.....Geoacoustic inversion
.....Turnkey project	.....Seismic measurements
....Research and development management	...Geophysical signal processing
.....Innovation management	...Geoscience
.....Creativity	.....Antarctica
....Research initiatives	.....South Pole
....Software development management	.....Arctic
.....Agile software development	.....North Pole
.....Scrum (Software development)	.....Atmosphere
.....Model-driven development	.....Air quality
	.....Atmospheric modeling
	.....Atmospheric waves
	.....Biosphere
	.....Continents
	.....Africa
	.....Asia
	.....Australia
	.....Europe
	.....North America
	.....South America
<b>Geoscience and remote sensing</b>	
....Environmental factors	
.....Biosphere	
.....Climate change	
.....Global warming	
.....Ecology	



.....Cyclones	.....Tsunami
.....Hurricanes	.....Volcanoes
.....Tropical cyclones	.....Planetary volcanoes
.....Earth	.....Volcanic activity
.....Earthquakes	.....Volcanic ash
.....Earthquake engineering	.....Wetlands
.....Forestry	...Land surface temperature
.....Geochemistry	...Photometry
.....Geoengineering	...Radar
.....Geography	.....Airborne radar
.....Rural areas	.....Bistatic radar
.....Urban areas	.....Cognitive radar
.....Geology	.....Doppler radar
.....Minerals	.....Ground penetrating radar
.....Rocks	.....High frequency radar
.....Geophysics	.....Laser radar
.....EMTDC	.....Meteorological radar
.....Extraterrestrial phenomena	.....Millimeter wave radar
.....Geodynamics	.....Multistatic radar
.....Geophysics computing	.....MIMO radar
.....Meteorology	.....Passive radar
.....Moisture	.....Radar applications
.....Seismology	.....Radar countermeasures
.....Surface waves	.....Radar detection
.....Well logging	.....Radar imaging
.....Ice	.....Radar measurements
.....Ice shelf	.....Radar polarimetry
.....Ice surface	.....Radar remote sensing
.....Ice thickness	.....Radar tracking
.....Sea ice	.....Radar clutter
.....Lakes	.....Radar cross-sections
.....Land surface	.....Radar equipment
.....Levee	.....Radar theory
.....Meteorological factors	.....Spaceborne radar
.....Oceanography	.....Spread spectrum radar
.....Ocean circulation	.....Synthetic aperture radar
.....Oceans	.....Inverse synthetic aperture radar
.....Ocean salinity	.....Polarimetric synthetic aperture radar
.....Ocean temperature	.....Ultra wideband radar
.....Sea coast	...Radiometry
.....Sea floor	.....Microwave radiometry
.....Sea level	.....Radiometers
.....Sea surface	.....Spectroradiometers
.....Tides	...Remote sensing
.....Rivers	.....Hyperspectral sensors
.....Sediments	.....Hyperspectral imaging
.....Soil	.....Passive microwave remote sensing
.....Soil moisture	.....Remote monitoring
.....Soil properties	...Terrain mapping
.....Soil texture	.....Digital elevation models
.....Tornadoes	



- ....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

**Imaging**

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



- .....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
  - .....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	.....Agricultural products
....Electrostatic precipitators	.....Aquaculture
....Electrostatic processes	.....Fertilizers
.....Aerosols	.....Greenhouses
.....Electrophotography	.....Irrigation
.....Electrostatic analysis	.....Architecture
.....Electrostatic induction	.....Banking
.....Electrostatics	.....Online banking
.....Electrostatic levitation	.....Beverage industry
.....Particle charging	.....Chemical industry
.....Particle production	.....Coal industry
.....Space charge	.....Communication industry
.....Surface charging	.....Computer industry
.....Triboelectricity	.....Construction
.....Triboelectricity	.....Buildings
....Engines	.....Green buildings
.....Heat engines	.....Modular construction
.....Steam engines	.....Prefabricated construction
.....Stirling engines	.....Construction industry
.....Internal combustion engines	.....Prefabricated construction
.....Diesel engines	.....Defense industry
.....Ignition	.....Electrical engineering industry
.....Jet engines	.....Entertainment industry
....Environmental management	.....Sports
.....Biodegradation	.....Gas industry
.....Biodegradable materials	.....Information industry
.....Land use planning	.....Manufacturing industries
.....Pest control	.....Aerospace industry
.....Pollution control	.....Cement industry
.....Recycling	.....Ceramics industry
.....Renewable energy sources	.....Clothing industry
.....Biomass	.....Electrical products industry
.....Sustainable development	.....Electronics industry
.....Waste management	.....Food industry
.....Waste disposal	.....Footwear industry
.....Waste handling	.....Fuel processing industries
.....Waste recovery	.....Glass industry
.....Waste reduction	.....Machinery production industries
.....Water conservation	.....Metal product industries
.....Desalination	.....Plastics industry
.....Water resources	.....Pulp and paper industry
.....Desalination	.....Rubber industry
.....Reservoirs	.....Shipbuilding industry
....Food technology	.....Textile industry
.....Food preservation	.....Toy manufacturing industry
....High-temperature techniques	.....Metals industry
.....Rapid thermal processing	.....Mining industry
....Industrial engineering	.....Coal mining
.....Industrial communication	.....Natural gas industry
....Industries	.....Petroleum industry
.....Agriculture	.....Oil drilling





.....Oil refineries	.....Machine components
.....Well logging	.....Air cleaners
.....Power industry	.....Belts
.....Electrical equipment industry	.....Cams
.....Electricity supply industry	.....Engine cylinders
.....Nuclear facility regulation	.....Exhaust systems
.....Power system interconnection	.....Impellers
.....Steel industry	.....Intake systems
.....Sugar industry	.....Manifolds
.....Sugar refining	.....Mechanical splines
.....Textile technology	.....Pistons
.....Spinning	.....Rotors
.....Weaving	.....Shafts
.....Toy industry	.....Valves
.....Transportation industry	.....Motors
.....Wood industry	.....AC motors
....Inspection	.....Brushless motors
.....Automatic optical inspection	.....Commutation
....Machinery	.....DC motors
.....Agricultural machinery	.....Electric motors
.....Agricultural robots	.....Hysteresis motors
.....Ball bearings	.....Induction motors
.....Belts	.....Micromotors
.....Drives	.....Permanent magnet motors
.....Hydraulic drives	.....Servomotors
.....Motor drives	.....Traction motors
.....Variable speed drives	.....Universal motors
.....Electric machines	.....Printing machinery
.....AC machines	.....Pumps
.....Alternators	.....Fuel pumps
.....Brushless machines	.....Heat pumps
.....Compressors	.....Insulin pumps
.....Conductors	.....Micropumps
.....DC machines	.....Water pumps
.....Electric fences	.....Textile machinery
.....Generators	.....Spinning machines
.....Permanent magnet machines	....Manufacturing
.....Rotating machines	.....Assembly
.....Rotors	.....Fitting
.....Stators	.....Microassembly
.....Washing machines	.....Preforms
.....Fans	.....Soldering
.....Furnaces	.....Assembly systems
.....Blast furnaces	.....Flexible electronics
.....Kilns	.....Robotic assembly
.....Gears	.....Embossing
.....Magnetic gears	.....Fabrication
.....Hydraulic systems	.....Bonding processes
.....Electrohydraulics	.....Microfabrication
.....Hydraulic equipment	.....Optical device fabrication
.....Hydraulic fluids	.....Soldering



.....Welding	.....Mass customization
.....Green manufacturing	.....Smart manufacturing
.....Lithography	.....Tolerance analysis
.....Colloidal lithography	...Packaging
.....Extreme ultraviolet lithography	.....Bagging
.....Interferometric lithography	.....Bottling
.....Nanolithography	.....Canning
.....Soft lithography	.....Encapsulation
.....Stereolithography	.....Food packaging
.....X-ray lithography	.....Labeling
.....Manufactured products	.....Multichip modules
.....Ceramic products	.....Nanopackaging
.....Chemical products	.....Plastic packaging
.....Consumer products	.....Wrapping
.....Electrical products	...Paper technology
.....Food products	...Production
.....Fuels	.....Ball milling
.....Glass products	.....Compression molding
.....Mechanical products	.....Embossing
.....Metal products	.....Food products
.....Paper products	.....Dairy products
.....Paper pulp	.....Fats
.....Plastic products	.....Food waste
.....Rubber products	.....Sugar
.....Sports equipment	.....Group technology
.....Textile products	.....Injection molding
.....Tools	.....Materials processing
.....Windows	.....Annealing
.....Manufacturing systems	.....Bleaching
.....Agile manufacturing	.....Casting
.....Automobile manufacture	.....Coatings
.....Batch production systems	.....Curing
.....Blanking	.....Etching
.....Cellular manufacturing	.....Heat treatment
.....Flow production systems	.....Joining processes
.....Food manufacturing	.....Lamination
.....Forging	.....Machining
.....Glass manufacturing	.....Melt processing
.....Integrated manufacturing systems	.....Plasma materials processing
.....Intelligent manufacturing systems	.....Plating
.....Job production systems	.....Pressing
.....Joining processes	.....Punching
.....Layered manufacturing	.....Refining
.....Lean production	.....Shearing
.....Manufacturing processes	.....Smelting
.....Mass production	.....Softening
.....Melt processing	.....Swaging
.....Pulp manufacturing	.....Mechanical products
.....Sheet metal processing	.....Automotive components
.....Thermoforming	.....Axles
.....Three-dimensional printing	.....Bellows



.....Blades	.....Control charts
.....Brakes	.....Inventory management
.....Couplings	.....Lead time reduction
.....Fasteners	.....Logistics
.....Flanges	.....Process planning
.....Gears	.....Production planning
.....Hoses	.....Production materials
.....Machine components	.....Abrasives
.....Mechanical guides	.....Aerospace materials
.....Needles	.....Automotive materials
.....Orifices	.....Inhibitors
.....Pistons	.....Ink
.....Pressure vessels	.....Joining materials
.....Seals	.....Lubricants
.....Springs	.....Retardants
.....Steering systems	.....Production systems
.....Structural shapes	.....Assembly systems
.....Tires	.....Exhaust systems
.....Vents	.....Intelligent manufacturing systems
.....Wheels	.....Lean production
.....Process planning	.....Manufacturing systems
.....Business process integration	.....Steering systems
.....Business process management	.....Productivity
.....Cause effect analysis	.....Shafts
.....Production control	.....Camshafts
.....Continuous production	.....Springs
.....Lot sizing	.....Transfer molding
.....Optimized production technology	.....Safety
.....Scheduling	.....Aerospace safety
.....Production engineering	.....Air safety
.....Production planning	.....Domestic safety
.....Production equipment	.....Emergency services
.....Applicators	.....Explosion protection
.....Clamps	.....Fire safety
.....Cutting tools	.....Hazards
.....Fixtures	.....Biohazards
.....Machine tools	.....Chemical hazards
.....Mining equipment	.....Explosions
.....Molding equipment	.....Fires
.....Packaging machines	.....Flammability
.....Paper making machines	.....Floods
.....Polishing machines	.....Hazardous areas
.....Soldering equipment	.....Hazardous materials
.....Production facilities	.....Toxicology
.....Foundries	.....Health and safety
.....Greenhouses	.....Occupational health
.....Industrial facilities	.....Occupational safety
.....Industrial plants	.....Marine safety
.....Machine shops	.....Product safety
.....Paper mills	.....Protection
.....Production management	.....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
  - .....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-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
  - .....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	.....Dosimetry
.....Flowmeters	.....Dynamic range
.....Goniometers	.....Electric variables measurement
.....Potentiometers	.....Admittance measurement
.....Radiometers	.....Ammeters
.....Tachometers	.....Attenuation measurement
.....Vibrometers	.....Capacitance measurement
.....Voltmeters	.....Conductivity measurement
.....Wathour meters	.....Current measurement
.....Wattmeters	.....Dielectric measurement
.....Microscopy	.....Electrical resistance measurement
.....Atomic force microscopy	.....Electrostatic measurements
.....Electron microscopy	.....Energy measurement
.....Endomicroscopy	.....Impedance measurement
.....Scanning microwave microscopy	.....Inductance measurement
.....Scanning probe microscopy	.....Partial discharge measurement
.....Network analyzers	.....Phasor measurement units
.....Oscilloscopes	.....Power measurement
.....Pressure gauges	.....Q measurement
.....Probes	.....Transmission line measurements
.....Telescopes	.....Voltage measurement
.....Theodolites	.....Electromagnetic measurements
.....Tuners	.....Electromagnetic modeling
...Measurement	.....Linearity
.....Accelerometers	.....Microwave measurement
.....Acoustic measurements	.....Millimeter wave measurements
.....Antenna measurements	.....Parameter extraction
.....Anthropometry	.....Polarimetry
.....Area measurement	.....Radiometry
.....Atmospheric measurements	.....Submillimeter wave measurements
.....Atomic measurements	.....Extraterrestrial measurements
.....Biomedical measurement	.....Fluid flow measurement
.....Biomarkers	.....Frequency measurement
.....Biomedical monitoring	.....Frequency estimation
.....Electroencephalography	.....Frequency-domain analysis
.....Electromyography	.....Gain measurement
.....Electrooculography	.....Gas chromatography
.....Electrophysiology	.....Geologic measurements
.....Photoplethysmography	.....Geophysical measurements
.....Pulse oximeter	.....Geodesy
.....Reproducibility of results	.....Sea measurements
.....Sensitivity and specificity	.....Seismic measurements
.....Calorimetry	.....Interferometry
.....Coordinate measuring machines	.....Fabry-Perot
.....Density measurement	.....Interferometers
.....Hydrometers	.....Optical interferometry
.....Distance measurement	.....Phase shifting interferometry
.....Euclidean distance	.....Radar interferometry
.....Distortion measurement	.....Radio interferometry
.....Total harmonic distortion	.....Sagnac interferometers
.....Doppler measurement	.....Key performance indicator



.....Length measurement	.....Key performance indicator
.....Lifetime estimation	.....pH measurement
.....Loss measurement	.....Phase measurement
.....Packet loss	.....Plasma measurements
.....Magnetic variables measurement	.....Plethysmography
.....Magnetic anomaly detection	.....Pollution measurement
.....Magnetic field measurement	.....Pressure measurement
.....Magnetometers	.....Altimetry
.....Permeability measurement	.....Tire pressure
.....Measurement by laser beam	.....Pulse measurements
.....Laser velocimetry	.....Reflectometry
.....Measurement errors	.....Reproducibility of results
.....Measurement techniques	.....Scintillation counters
.....Calibration	.....Solid scintillation detectors
.....Dynamic equilibrium	.....Sea state
.....Measurement uncertainty	.....Semiconductor device measurement
.....Measurement units	.....Sensitivity
.....International System of Units	.....Sensitivity analysis
.....Nanometers	.....Shape measurement
.....Mechanical variables measurement	.....Size measurement
.....Angular velocity	.....Functional point analysis
.....Displacement measurement	.....Software measurement
.....Force measurement	.....Soil measurements
.....Motion measurement	.....Salinity (geophysical)
.....Position measurement	.....Spectral efficiency
.....Rotation measurement	.....Spectroscopy
.....Strain measurement	.....Deep level transient spectroscopy
.....Stress measurement	.....Electrochemical impedance spectroscopy
.....Thickness measurement	.....Electron paramagnetic resonance
.....Torque measurement	.....Fourier transform infrared spectroscopy
.....Velocity measurement	.....Kirchhoff's Law
.....Vibration measurement	.....Mass spectroscopy
.....Volume measurement	.....MERIS
.....Weight measurement	.....Neutron spin echo
.....Micrometers	.....Photoacoustic effects
.....Moisture measurement	.....Resonance light scattering
.....Humidity measurement	.....Thermal variables measurement
.....Noise measurement	.....Temperature measurement
.....Multiple signal classification	.....Time measurement
.....Noise figure	.....Clocks
.....Noise shaping	.....Time dissemination
.....Nuclear measurements	.....Timing
.....Particle tracking	.....UHF measurements
.....Optical variables measurement	.....Ultrasonic variables measurement
.....Ellipsometry	.....Viscosity
.....Photometry	.....Wavelength measurement
.....Reflection coefficient	.....Wide area measurements
.....Refractive index	.....Monitoring
.....Particle beam measurements	.....Computerized monitoring
.....Particle measurements	
.....Performance evaluation	



- .....Environmental monitoring
- .....Patient monitoring
- .....Process monitoring
- .....Radiation monitoring
- .....Radiation dosage
- .....Remote monitoring
- .....Surveillance
- .....Infrared surveillance
- .....Video surveillance
- ....Pulse oximetry
- ....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

### **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
  - .....Intelligent vehicles
  - .....Land vehicles
  - .....Military vehicles
  - .....Space vehicles

### **Lasers and electrooptics**

- ....Electrooptic devices
  - .....Electrochromic devices
  - .....Electrooptic deflectors
  - .....Electrooptic modulators
- ....Electrooptic effects
  - .....Electrochromism
  - .....Kerr effect
  - .....Optical bistability
  - .....Stark effect
- ....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 fusion
    - .....Laser theory
      - .....Magneto-optic recording
    - .....Laser excitation
      - .....Optical pumping
    - .....Laser modes
      - .....Laser mode locking
    - .....Laser stability
    - .....Laser transitions
  - .....Power lasers
  - .....Pump lasers
  - .....Quantum well lasers
    - .....Quantum cascade lasers
  - .....Ring lasers
    - .....Fiber lasers
  - .....Semiconductor lasers
    - .....Laser tuning
    - .....Quantum dot lasers

- .....Quantum well lasers
- .....Semiconductor laser arrays
- .....Semiconductor optical amplifiers
- .....Surface emitting lasers
- .....Solid lasers
  - .....Microchip lasers
  - .....Quantum well lasers
  - .....Semiconductor lasers
  - .....Surface emitting lasers
  - .....Surface emitting lasers
  - .....Vertical cavity surface emitting lasers
  - .....X-ray lasers
- ....Optics
  - .....Adaptive optics
  - .....Birefringence
  - .....Brightness
    - .....Brightness temperature
  - .....Color
    - .....Pigmentation
  - .....Electron optics
  - .....Extinction coefficients
    - .....Extinction ratio
  - .....Fiber optics
    - .....Fiber nonlinear optics
    - .....Optical fibers
  - .....Fluorescence
    - .....Four-wave mixing
  - .....Geometrical optics
    - .....Ray tracing
  - .....Integrated optics
  - .....Light fields
  - .....Light sources
    - .....Electroluminescent devices
    - .....Fast light
    - .....Luminescent devices
      - .....Phosphors
      - .....Slow light
      - .....Stray light
    - .....Superluminescent diodes
    - .....Ultraviolet sources
  - .....Luminescence
    - .....Bioluminescence
    - .....Electroluminescence
    - .....Fluorescence
    - .....Phosphorescence
    - .....Photoluminescence
    - .....Thermoluminescence
  - .....Microoptics
    - .....Micromirrors
    - .....Nonlinear optics



- .....Fiber nonlinear optics
  - .....Nonlinear optical devices
  - .....Optical mixing
  - .....Optical saturation
  - .....Photorefractive effect
  - .....Raman scattering
  - .....Supercontinuum generation
  - .....Optical amplifiers
  - .....Doped fiber amplifiers
  - .....Erbium-doped fiber amplifiers
  - .....Semiconductor optical amplifiers
  - .....Optical crosstalk
  - .....Optical design
  - .....Optical design techniques
  - .....Optical devices
  - .....Bragg gratings
  - .....Collimators
  - .....Displays
  - .....Holographic optical components
  - .....Lenses
  - .....Light deflectors
  - .....Lighting
  - .....Luminescent devices
  - .....Mirrors
  - .....Optical arrays
  - .....Optical attenuators
  - .....Optical collimators
  - .....Optical device fabrication
  - .....Optical filters
  - .....Optical resonators
  - .....Optical sensors
  - .....Thermo-optical 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	.....Garnet films
.....Circulators	.....Garnets
.....Magnetic cores	.....Garnet films
.....Transformer cores	.....Magnetic films
.....Magnetic gears	.....Ferrimagnetic films
.....Magnetic heads	.....Ferrite films
.....Magnetic memory	.....Garnet films
.....Floppy disks	.....Magnetic liquids
.....Hard disks	.....Magnetic semiconductors
.....Magnetic modulators	.....Magnetic superlattices
.....Magneto optic devices	.....Paramagnetic materials
.....Magnetoresistive devices	.....Soft magnetic materials
.....Magnetostrictive devices	...Magnetic multilayers
.....Solenoids	...Magnetic particles
.....Transformer cores	...Magnetic properties
.....Undulators	...Magnetic sensors
...Magnetic fields	.....Spin valves
.....Geomagnetism	...Magnetic susceptibility
.....Magnetic reconnection	...Magnetic switching
.....Magnetic separation	...Magnetization processes
.....Magnetostatics	.....Magnetization reversal
.....Toroidal magnetic fields	.....Saturation magnetization
...Magnetic flux	...Magnetoacoustic effects
.....Flux pinning	...Magnetoelectric effects
.....Magnetic flux density	.....Hall effect
.....Magnetic flux leakage	.....Magnetic tunneling
...Magnetic force microscopy	.....Magnetoelectronics
...Magnetic forces	.....Spin polarized transport
.....Coercive force	.....Magnetoresistance
...Magnetic hysteresis	.....Anisotropic magnetoresistance
...Magnetic levitation	.....Ballistic magnetoresistance
.....Magnetic levitation vehicles	.....Colossal magnetoresistance
...Magnetic losses	.....Enhanced magnetoresistance
...Magnetic materials	.....Extraordinary magnetoresistance
.....Amorphous magnetic materials	.....Giant magnetoresistance
.....Antiferromagnetic materials	.....Ordinary magnetoresistance
.....Diamagnetic materials	.....Tunneling magnetoresistance
.....Ferrimagnetic films	.....Spintronics
.....Ferrite films	...Magnetomechanical effects
.....Garnet films	.....Magnetic field induced strain
.....Ferrimagnetic materials	.....Magnetoelasticity
.....Ferrimagnetic films	.....Magnetostriction
.....Ferrite films	.....Magnetostriction
.....Ferrites	...Magneto optic effects
.....Garnet films	.....Faraday effect
.....Garnets	.....Gyrotropism
.....Ferrite films	...Magnets
.....Ferrites	.....Electromagnets
.....Ferrite films	.....Superconducting magnets
.....Ferrofluid	.....Micromagnetics
.....Ferromagnetic materials	.....Permanent magnets



- ....Magnonics
- ....Microwave magnetics
- ....Nonlinear magnetics
- ....Remanence

### Materials, elements, and compounds

- ....Chemical elements
  - .....Actinium
  - .....Aluminium
  - .....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
  - .....Darmstadtium
  - .....Dysprosium
  - .....Dysprosium compounds
  - .....Europium
  - .....Fluorine
  - .....Fluorine compounds
  - .....Francium
  - .....Gadolinium
  - .....Gadolinium oxide
  - .....Hafnium
  - .....Hafnium compounds
  - .....Helium
  - .....Holmium
  - .....Hydrogen
  - .....Deuterium
  - .....Iodine

- .....Iodine compounds
- .....Iridium
- .....Isotopes
- .....Krypton
- .....Lutetium
- .....Mercury (metals)
- .....Molybdenum
- .....Neon
- .....Neptunium
- .....Nitrogen
- .....Silicon nitride
- .....Osmium
- .....Oxygen
- .....Phosphorus
- .....Plutonium
- .....Polonium
- .....Potassium
- .....Praseodymium
- .....Promethium
- .....Protactinium
- .....Radium
- .....Radon
- .....Rhenium
- .....Rhodium
- .....Roentgenium
- .....Rubidium
- .....Ruthenium
- .....Scandium
- .....Selenium
- .....Sodium
- .....Sulfur
- .....Sulfur compounds
- .....Tantalum
- .....Technetium
- .....Tellurium
- .....Terbium
- .....Thallium
- .....Thorium
- .....Thulium
- .....Titanium
- .....Titanium alloys
- .....Titanium compounds
- .....Titanium dioxide
- .....Titanium nitride
- .....Uranium
- .....Vanadium
- .....Ytterbium
- .....Yttrium
- .....Yttrium compounds
- .....Zirconium
- ....Compounds



.....Bismuth compounds	.....Windows
.....Gallium compounds	.....Catalysts
.....Aluminum gallium nitride	.....Photocatalysts
.....Gallium arsenide	.....Ceramics
.....Gallium nitride	.....Bioceramics
.....Indium gallium arsenide	.....Porcelain
.....Indium gallium nitride	.....Composite materials
.....Indium compounds	.....Cermet
.....Indium gallium arsenide	.....Conducting materials
.....Indium tin oxide	.....Electrolytes
.....Inorganic compounds	.....Corrosion inhibitors
.....Lead compounds	.....Crystalline materials
.....Organic compounds	.....Martensite
.....Carbon compounds	.....Nanocrystals
.....Organic semiconductors	.....Superlattices
.....Volatile organic compounds	.....Crystals
.....Silicon compounds	.....Colloidal crystals
.....Silicides	.....Crystal microstructure
.....Silicon carbide	.....Crystallography
.....Silicon nitride	.....Grain boundaries
....Material storage	.....Grain size
.....Bulk storage	.....Liquid crystals
.....Containers	.....Quartz crystals
.....Freight containers	.....Dielectric materials
.....Fuel storage	.....Dielectric films
.....Secure storage	.....Dielectric liquids
.....Stacking	.....Electrets
.....Storage automation	.....Epoxy resins
.....Warehousing	.....High-k dielectric materials
.....Water storage	.....Piezoelectric materials
.....Dams	.....Films
.....Reservoirs	.....Conductive films
....Materials	.....Dielectric films
.....Acoustic materials	.....Epitaxial layers
.....Additives	.....Ferrimagnetic films
.....Aggregates	.....Ferrite films
.....Amorphous materials	.....Garnet films
.....Diamond-like carbon	.....Magnetic films
.....Glass	.....Optical films
.....Auxetic materials	.....Piezoelectric films
.....Biological materials	.....Plastic films
.....Bioceramics	.....Polymer films
.....Biomedical materials	.....Semiconductor films
.....Bioceramics	.....Thick films
.....Biomembranes	.....Thin films
.....Building materials	.....Fluids
.....Asphalt	.....Ferrofluid
.....Concrete	.....Fluid dynamics
.....Floors	.....Gases
.....Mortar	.....Hydraulic fluids
.....Tiles	.....Liquids



.....Viscosity	.....Organic inorganic hybrid materials
.....Hazardous materials	.....Organic materials
.....Inorganic materials	.....Paints
.....Lacquers	.....Paper pulp
.....Laminates	.....Petrochemicals
.....Magnetic materials	.....Phase change materials
.....Amorphous magnetic materials	.....Photoconducting materials
.....Antiferromagnetic materials	.....Plastics
.....Diamagnetic materials	.....Epoxy resins
.....Ferrimagnetic films	.....Fiber reinforced plastics
.....Ferrimagnetic materials	.....Plastic films
.....Ferrite films	.....Plastic optical fiber
.....Ferrites	.....Polymer foams
.....Ferrofluid	.....Polymer gels
.....Ferromagnetic materials	.....Polymers
.....Garnet films	.....Azobenzene
.....Garnets	.....Biopolymers
.....Magnetic films	.....Liquid crystal polymers
.....Magnetic liquids	.....Optical polymers
.....Magnetic semiconductors	.....Polycaprolactone
.....Magnetic superlattices	.....Polyethylene
.....Paramagnetic materials	.....Polyimides
.....Soft magnetic materials	.....Production materials
.....Material properties	.....Abrasives
.....Creep	.....Aerospace materials
.....Elasticity	.....Automotive materials
.....Resilience	.....Inhibitors
.....Media	.....Ink
.....Nonhomogeneous media	.....Joining materials
.....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 semiconductors	.....Hysteresis
.....Semiconductor superlattices	.....Impurities
.....Silicon	.....Semiconductor impurities
.....Silicon germanium	.....Materials handling
.....Substrates	.....Cleaning
.....Wide band gap semiconductors	.....Decontamination
.....Sheet materials	.....Freight handling
.....Smart materials	.....Materials handling equipment
.....Biomimetic materials	.....Pallets
.....Smart textiles	.....Remote handling
.....Solids	.....Materials preparation
.....Young's modulus	.....Doping
.....Superconducting materials	.....Firing
.....Granular superconductors	.....Ion implantation
.....High-temperature superconductors	.....Laser sintering
.....Multifilamentary superconductors	.....Sputtering
.....Niobium-tin	.....Materials reliability
.....Type II superconductors	.....Materials testing
.....Surfactants	.....Accelerated aging
.....Terahertz materials	.....Acoustic testing
.....Terahertz metamaterials	.....Adhesive strength
.....Textiles	.....Bonding forces
.....Cotton	.....Delamination
.....Fabrics	.....Elastic recovery
.....Textile fibers	.....Nondestructive testing
.....Wool	.....Metallurgy
.....Thermoelectric materials	.....Microstructure
.....Waste materials	.....Periodic structures
.....Effluents	.....Gratings
.....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	.....Rough surfaces
.....Chemical analysis	.....Surface impedance
.....Activation analysis	.....Surface morphology
.....Chemical processes	.....Surface resistance
.....Chemicals	.....Surface roughness
.....Electronic noses	.....Surface soil
.....pH measurement	.....Surface structures
.....Contamination	.....Surface tension
.....Surface contamination	.....Surface texture
.....Degradation	.....Surface topography
.....Filtration	.....Surface treatment
.....Microfiltration	....Metals



.....Alloying	.....Neodymium compounds
.....Intermetallic	.....Nickel
.....Shape memory alloys	.....Nickel alloys
.....Aluminum	.....Nickel compounds
.....Aluminum alloys	.....Niobium
.....Aluminum compounds	.....Niobium alloys
.....Barium	.....Niobium compounds
.....Barium compounds	.....Palladium
.....Bismuth	.....Platinum
.....Boron	.....Platinum alloys
.....Boron alloys	.....Rare earth metals
.....Cadmium	.....Samarium
.....Cadmium compounds	.....Samarium alloys
.....Calcium	.....Silver
.....Calcium compounds	.....Steel
.....Chromium	.....Martensite
.....Chromium alloys	.....Strontium
.....Cobalt	.....Strontium compounds
.....Cobalt alloys	.....Tin
.....Copper	.....Tin alloys
.....Copper alloys	.....Tin compounds
.....Copper compounds	.....Titanium
.....Digital alloys	.....Titanium alloys
.....Erbium	.....Titanium compounds
.....Gallium	.....Titanium dioxide
.....Gallium alloys	.....Titanium nitride
.....Germanium	.....Tungsten
.....Germanium alloys	.....Yttrium
.....Gold	.....Yttrium compounds
.....Gold alloys	.....Zinc
.....Hafnium	.....Zinc compounds
.....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	

## 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	.....Differential equations
.....Algorithm design and analysis	.....Differential algebraic equations
.....Algorithmic efficiency	.....Differential operators
.....Generative adversarial networks	.....Navier-Stokes equations
.....Algorithm design and theory	.....Ordinary differential equations
.....Consensus algorithm	.....Partial differential equations
.....Approximation algorithms	.....Transfer functions
.....Artificial bee colony algorithm	.....Integral equations
.....Backpropagation algorithms	.....Probability density function
.....Basis algorithms	.....Level set
.....Change detection algorithms	...Closed-form solutions
.....Classification algorithms	...Combinatorial mathematics
.....Clustering algorithms	.....Graph theory
.....Compression algorithms	.....Bipartite graph
.....Density estimation robust algorithm	.....Directed acyclic graph
.....Detection algorithms	.....Optimal matching
.....Distributed algorithms	.....Reachability analysis
.....Dynamic programming	.....Shortest path problem
.....Filtering algorithms	.....Tree graphs
.....Genetic algorithms	.....Steiner trees
.....Hash functions	...Computational efficiency
.....Cryptographic hash function	...Conformal mapping
.....Heuristic algorithms	...Convergence
.....Inference algorithms	...Convex functions
.....Machine learning algorithms	...Cyclic redundancy check
.....Matching pursuit algorithms	.....Cyclic redundancy check codes
.....Maximum likelihood detection	...Dynamical systems
.....MLFMA	.....Nonlinear dynamical systems
.....Multicast algorithms	...Eigenvalues and eigenfunctions
.....Parallel algorithms	...Equations
.....Partitioning algorithms	.....Boltzmann equation
.....Prediction algorithms	.....Difference equations
.....Projection algorithms	.....Integrodifferential equations
.....Pursuit algorithms	.....Maxwell equations
.....Signal processing algorithms	.....Nonlinear equations
.....Software algorithms	.....Bifurcation
.....Viterbi algorithm	.....Polynomials
...Arithmetic	.....Riccati equations
.....Digital arithmetic	...Estimation
.....Fixed-point arithmetic	.....Estimation error
.....Floating-point arithmetic	.....Estimation theory
...Azimuth	.....Cramer-Rao bounds
.....Azimuthal angle	.....Maximum a posteriori estimation
.....Azimuthal component	.....Functional point analysis
.....Azimuthal current	.....Life estimation
.....Azimuthal harmonics	.....Maximum likelihood estimation
.....Azimuthal plane	.....Pose estimation
...Boundary value problems	.....State estimation
.....Boundary conditions	.....Observers
.....Upper bound	.....Yield estimation
...Calculus	...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
  - .....Optimal matching
  - .....Reachability analysis
  - .....Shortest path problem
  - .....Tree graphs
- ....Harmonic analysis
- ....Iterative methods
  - .....Expectation-maximization algorithms
  - .....Iterative algorithms
    - .....Belief propagation
    - .....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 approximation
    - .....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



.....Circuit optimization	....Simulated annealing
.....Design optimization	....Smoothing methods
.....Fireworks algorithm	....Spirals
.....Gradient methods	....Statistics
.....H infinity control	.....Adaptive estimation
.....Mathematical programming	.....Autoregressive processes
.....Optimized production technology	.....Boltzmann distribution
.....Pareto optimization	.....Lattice Boltzmann methods
.....Quadratic programming	.....Correlation
.....Simulated annealing	.....Autocorrelation
.....Trajectory optimization	.....Correlation coefficient
....Piecewise linear techniques	.....Covariance matrices
.....Piecewise linear approximation	.....Differential privacy
....Predator prey systems	.....Dimensionality reduction
....Probability	.....Gamma distribution
.....Ant colony optimization	.....Gaussian mixture model
.....Bayes methods	.....Higher order statistics
.....Recursive estimation	.....Histograms
.....Error probability	.....Linear discriminant analysis
.....Forecasting	.....Maximum likelihood estimation
.....Demand forecasting	.....Minimax techniques
.....Economic forecasting	.....Mixture models
.....Forecast uncertainty	.....Nonparametric statistics
.....Technology forecasting	.....Nearest neighbor methods
.....Memoryless systems	.....Parametric statistics
.....Pairwise error probability	.....Prediction theory
.....Possibility theory	.....Ranking (statistics)
.....Probability distribution	.....Root mean square
.....Exponential distribution	.....Sampling methods
.....Log-normal distribution	.....Compressed sensing
.....Maxwell-Boltzmann distribution	.....Nonuniform sampling
.....Nakagami distribution	.....Statistical analysis
.....Random variables	.....Analysis of variance
.....Statistical distributions	.....Mode matching methods
.....Distribution functions	.....Monte Carlo methods
.....Gaussian distribution	.....Parameter estimation
.....Weibull distribution	.....Pareto analysis
.....Uncertainty	.....Principal component analysis
.....Forecast uncertainty	.....Regression analysis
....Quaternions	.....Static analysis
....Random processes	.....Time series analysis
.....Brownian motion	....Stochastic processes
.....Random forests	.....Gaussian processes
....Root mean square	.....Gaussian mixture model
....Sequences	.....Markov processes
.....Binary sequences	.....Markov random fields
.....Random sequences	....Superposition calculus
....Set theory	....Taylor series
.....Fuzzy set theory	....Tensors
.....Fuzzy sets	....Topology
.....Rough sets	....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
- .....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
- .....Pulse inverters
- .....Resonant 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 Internet
- .....Energy management
- .....Demand side management
- .....Energy conservation
- .....Energy efficiency
- .....Energy informatics
- .....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
- .....Magnetohydrodynamic power generation
- .....Nuclear power generation
- .....Atomic batteries
- .....Fission reactors
- .....Fusion power generation
- .....Power generation control
- .....Power generation dispatch
- .....Power generation planning
- .....Solar power generation
- .....Maximum power point trackers
- .....Photovoltaic systems
- .....Solar panels
- .....Trigeneration
- .....Turbomachinery
- .....Turbines
- .....Turbogenerators
- .....Wind energy generation
- .....Wind energy integration
- .....Wind power generation
- ...Power systems
- .....Data center power



- .....Hybrid power systems
  - .....Industrial power systems
  - .....Power distribution
    - .....DC distribution systems
    - .....Power distribution faults
    - .....Power distribution lines
  - .....Power grids
    - .....Microgrids
    - .....Smart grids
  - .....Power supplies
    - .....Battery chargers
    - .....Charging stations
    - .....Current supplies
    - .....Emergency power supplies
    - .....Inductive charging
    - .....Islanding
    - .....Power demand
    - .....Power quality
    - .....Power system restoration
    - .....Switched mode power supplies
    - .....Traction power supplies
    - .....Umbilical cable
  - .....Power system analysis computing
  - .....Power system dynamics
  - .....Power system economics
    - .....Low-carbon economy
  - .....Power system faults
    - .....Power system harmonics
    - .....Power harmonic filters
  - .....Power system management
    - .....Load flow
  - .....Power system measurements
    - .....Meter reading
  - .....Power system planning
    - .....Power demand
  - .....Power system protection
    - .....Electrical safety
    - .....Substation protection
    - .....Surge protection
  - .....Power system reliability
  - .....Power system stability
  - .....Power transmission
    - .....Common Information Model (electricity)
      - .....DC power transmission
      - .....Flexible AC transmission systems
      - .....HVDC transmission
      - .....Inductive power transmission
      - .....Static VAr compensators
      - .....Transmission lines
      - .....Wireless power transmission
    - .....PSCAD
    - .....Pulsed power systems
      - .....Pulsed power supplies
    - .....Reactive power
    - .....Substations
      - .....Substation automation
      - .....Substation protection
    - .....Transformers
      - .....Baluns
      - .....Current transformers
      - .....Flyback transformers
      - .....Instrument transformers
      - .....Phase transformers
      - .....Power transformers
      - .....Pulse transformers
      - .....Tap changers
    - .....Uninterruptible power systems
    - .....Wind energy integration
- Product safety engineering**
- ....Consumer protection
  - ....Power system protection
    - .....Electrical safety
      - .....Fault protection
      - .....Grounding
      - .....Substation protection
      - .....Surge protection
    - .....Arresters
  - ....Safety
    - .....Aerospace safety
      - .....Air safety
      - .....Domestic safety
      - .....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
      - .....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
- ....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
- .....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
- .....Facebook
- .....Flickr
- .....LinkedIn
- .....MySpace
- .....Second Life
- .....Twitter
- .....YouTube
- .....Tagging
- .....Tag clouds
- .....Taxonomy
- .....Terminology
- .....Dictionaries



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



- ....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
  - .....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
- .....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
    - .....Orbits
    - .....Stellar dynamics
    - .....Extrasolar planets
      - .....Extrasolar planetary atmospheres
      - .....Extrasolar planetary mass
  - .....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
    - .....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
    - .....Gene therapy
    - .....Genetic communication
    - .....Genetic expression
    - .....Genetic programming
    - .....Genomics
  - .....Homeostasis
  - .....Mechanobiology



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



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



.....Lorentz covariance	.....Thermoelectricity
.....Mechanical factors	.....Thermolysis
.....Acceleration	.....Thermooptic effects
.....Aerodynamics	.....Thermoresistivity
.....Biomechanics	.....Waves
.....Damping	.....Atmospheric waves
.....Dynamics	.....Berry phase
.....Fatigue	.....Doppler effect
.....Force	.....Electrodynamics
.....Friction	.....Magnetostatic waves
.....Hydrodynamics	.....Matter waves
.....Kinematics	.....Plasma waves
.....Lubrication	.....Propagation
.....Magnetohydrodynamics	.....Reflectivity
.....Photoelasticity	.....Seismic waves
.....Pressure effects	.....Shock waves
.....Shock (mechanics)	.....Solitons
.....Strain	.....Surface acoustic waves
.....Stress	.....Wave functions
.....Surface cracks	...Social sciences
.....Torque	.....Behavioral sciences
.....Vibrations	.....Animal behavior
.....Volume relaxation	.....Cognition
.....Workability	.....Consumer behavior
.....Network theory (graphs)	.....Psychiatry
.....Physics education	.....Psychology
.....Quantum mechanics	.....Social intelligence
.....Coherence time	.....Journalism
.....Density functional theory	.....Psychology
.....Lagrangian functions	.....Active perception
.....Proton effects	.....Emotional responses
.....Quantum capacitance	.....Industrial psychology
.....Quantum cryptography	.....Mental health
.....Quantum entanglement	.....Mood
.....Quantum information science	.....Neuropsychology
.....Quantum key distribution	.....Psychometric testing
.....Relativistic quantum mechanics	.....Sociology
.....Schrodinger equation	.....Digital divide
.....Stationary state	.....Social groups
.....Teleportation	.....Social intelligence
.....Tunneling	...Thermodynamics
.....Solid-state physics	.....Enthalpy
.....String theory	.....Isobaric
.....Thermal factors	.....Isothermal processes
.....Temperature	
.....Temperature dependence	<b>Sensors</b>
.....Thermal conductivity	...Acoustic sensors
.....Thermal expansion	...Chemical and biological sensors
.....Thermal management	.....Biosensors
.....Thermal stresses	.....Gas detectors
.....Thermoelasticity	



- .....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 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
- .....Pulse amplifiers
- .....Radiofrequency amplifiers
- .....Resonators
- .....Cavity resonators
- .....Split ring resonators
- ....Array signal processing
- ....Attenuators
- .....Optical attenuators
- ....Chirp
- ....Convolution
- .....Convolver
- ....Decorrelation
- ....Digital signal processing
- .....Delta modulation
- .....Delta-sigma modulation
- .....Sigma-delta modulation
- .....Digital signal processing chips
- ....Dispersion
- .....Chromatic dispersion





- .....Optical fiber dispersion
- ....Distortion
  - .....Acoustic distortion
  - .....Four-wave mixing
  - .....Jitter
    - .....Timing jitter
  - .....Nonlinear distortion
    - .....Harmonic distortion
    - .....Intermodulation distortion
  - .....Phase distortion
- ....Error correction
  - .....Forward error correction
- ....Fading channels
  - .....Frequency-selective fading channels
  - .....Rayleigh channels
  - .....Weibull fading channels
- ....Filters
  - .....Active filters
    - .....Band-pass filters
    - .....Anisotropic
    - .....Bragg gratings
      - .....Fiber gratings
  - .....Channel bank filters
  - .....Comb filters
  - .....Digital filters
  - .....Finite impulse response filters
  - .....Equalizers
    - .....Adaptive equalizers
    - .....Blind equalizers
    - .....Decision feedback equalizers
  - .....Filtering theory
    - .....Image filtering
  - .....Gabor filters
  - .....Harmonic filters
  - .....IIR filters
  - .....Kalman filters
  - .....Low-pass filters
  - .....Matched filters
  - .....Microstrip filters
  - .....Nonlinear filters
  - .....Notch filters
  - .....Particle filters
  - .....Power filters
  - .....Spurline
  - .....Resonator filters
  - .....Spatial filters
  - .....Superconducting filters
  - .....Transversal filters
- ....Frequency locked loops
- ....Geophysical signal processing
- ....Limiting
- ....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
  - .....Multidimensional signal processing
    - .....Video signal processing
      - .....Motion artifacts
      - .....Video coding
      - .....Video compression
- ....Noise
  - .....1/f noise
  - .....Additive noise
    - .....Additive white noise
      - .....AWGN
    - .....Colored noise
    - .....Gaussian noise
      - .....AWGN
  - .....Laser noise
    - .....Laser feedback
  - .....Low-frequency noise
  - .....Noise cancellation
  - .....Phase noise
  - .....Signal to noise ratio
    - .....PSNR
  - .....Superconducting device noise
  - .....White noise
    - .....AWGN
- ....Optical signal processing
  - .....Laser noise



- .....Laser feedback
- ....Optical wavelength conversion
- ....Phase locked loops
- ....Pulse compression methods
- .....Optical pulse compression
- ....Pulse shaping methods
- .....Optical pulse shaping
- ....Quantization (signal)
- .....Vector quantization
- ....Radar signal processing
- ....Received signal strength indicator
- ....Recording
  - .....Audio recording
  - .....Digital recording
  - .....Disk recording
  - .....Magnetic recording
    - .....Digital magnetic recording
    - .....Heat-assisted magnetic recording
    - .....Magnetic noise
    - .....Magneto-optic recording
    - .....Microwave-assisted magnetic recording
  - .....Perpendicular magnetic recording
  - .....Shingled magnetic recording
- .....Optical recording
  - .....CD recording
  - .....Video recording
    - .....High definition video
    - .....Videos
    - .....Webcams
- ....RF signals
- ....Signal analysis
  - .....Discrete-event systems
  - .....Harmonic analysis
  - .....Parameter estimation
    - .....Amplitude estimation
    - .....Direction-of-arrival estimation
    - .....Frequency estimation
    - .....Motion estimation
    - .....Phase estimation
    - .....Time of arrival estimation
  - .....Signal mapping
  - .....Spectral analysis
    - .....Infrared spectra
    - .....Judd-Ofelt theory
    - .....Spectroradiometers
- ....Signal design
- ....Signal detection
  - .....Acoustic signal detection
  - .....Sonar detection
  - .....Motion detection

- .....Multiuser detection
- .....Optical signal detection
- .....Phase detection
  - .....Phase frequency detector
- .....Radar detection
- ....Signal generators
  - .....Noise generators
  - .....Pulse generation
    - .....Optical pulse generation
- ....Signal integrity
- ....Signal reconstruction
  - .....Signal denoising
- ....Signal resolution
  - .....Diversity reception
- ....Signal restoration
- ....Signal sampling
- ....Signal synthesis
  - .....Source separation
    - .....Blind source separation
- ....Spectrogram
- ....Tracking loops

### **Social implications of technology**

- ....Cultural differences
- ....Environmental factors
  - .....Biosphere
  - .....Climate change
    - .....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
- ....Globalization
- ....International relations
- ....Peace technology
- ....Philosophical considerations
- ....Social factors
- .....Demography
- .....Developing countries
- .....Technology social factors
- .....Privacy
- ....Sustainable development
- ....Technology
- .....Appropriate technology
- .....Disruptive technologies
- .....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
- .....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
  - .....Medical simulation
  - .....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
  - ....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
  - .....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
        - .....Mental health
          - .....Technology acceptance model
      - .....Identification of persons



- .....Biometrics (access control)
  - .....Face recognition
  - .....Fingerprint recognition
  - .....Gait recognition
  - .....Iris recognition
  - .....Palmpoint recognition
  - .....Face recognition
  - .....Fingerprint recognition
  - .....Handwriting recognition
  - .....Forgery
  - .....Speaker recognition
  - .....Speech recognition
    - .....Automatic speech recognition
    - .....Speech analysis
  - ...Man-machine systems
    - .....Extended reality
    - .....Interactive systems
      - .....External stimuli
  - ...Natural languages
    - .....Linguistics
      - .....Phonetics
      - .....Pragmatics
    - .....Natural language processing
      - .....Chatbot
      - .....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

- .....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
  - .....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

