

B ENGINEERING-THEMES

B0 SIGNAL & IMAGE PROCESSING

B00 LINEAR BIOSIGNAL ANALYSIS

- B000 Correlations & Regression
- B001 Filtering
- B002 Deconvolution
- B003 Finite Elements
- B004 Orthogonal Functions
- B0040 Fourier Methods*
- B0041 Walsh Functions*
- B0042 Haar Functions*
- B0043 Chebyshev Polynomials*
- B005 Time or Space-Frequency Decompositions
- B006 Wavelets

B01 NON-LINEAR BIOSIGNAL ANALYSIS

- B010 Data Compression Algorithms
- B011 Independent Component Analysis
- B012 Zero Crossing Analysis
- B013 Non-Linear Filtering
- B014 Non-Linear Dynamical Analysis

B02 STATISTICAL BIOSIGNAL ANALYSIS AND DETECTION

- B020 Adaptive Filtering
- B021 Detectors
- B022 Optimal Signal Processing
- B023 Principal Component Analysis
- B024 Spectral Estimation
- B025 Segmentation Algorithms

B03 IMAGE AND MULTIDIMENSIONAL BIOSIGNAL PROCESSING

- B030 Image Filtering & Restoration
- B031 Image Segmentation
- B032 Multi-Modal Image Fusion, Registration
- B033 Array Signal Processing
- B034 Multi-Dimensional Processing
- B035 Bio-Electric Mapping
- B036 Inverse Problems

- B04** **BIO SIGNAL MODELING**
- B040 Linear and Nonlinear Dynamical Models
 - B041 Nonlinear Oscillators
 - B042 Non-Convergent (Chaotic) Dynamical Models
 - B043 Fractal Models
 - B044 Coupled Space-Time Lattices
 - B045 Dynamic Neural Networks
 - B046 Self-Organizing Systems
 - B047 Synergetics

- B05** **BIO SIGNAL INTERPRETATION AND DIAGNOSTIC SYSTEMS**
- B050 AI Approaches
 - B0500 Expert Systems, Rule-based Decision*
 - B0501 Fuzzy Systems*
 - B0502 Genetic and Evolutionary Algorithms*
 - B051 Hybrid Diagnostic Systems
 - B052 Clustering
 - B053 Artificial Neural Networks
 - B054 Parametric Classifiers
 - B055 Nonparametric Classifiers
 - B056 Syntactic Classifiers

- B06** **BIO SIGNAL PROCESSORS**
- B060 Algorithm Implementation
 - B061 Real-Time Computing
 - B062 Automated Diagnosis

B1 INFORMATION SCIENCE & TECHNOLOGY

B10 MULTI-MEDIA APPLICATIONS

- B100 Graphical-User Interfaces
- B101 Data presentation through multi-senses
- B102 Computer-guided surgery
- B103 Haptic interfaces
- B104 Multimedia Standards and Standardization Issues

B11 COLLABORATIVE TECHNOLOGIES IN HEALTH CARE DELIVERY

- B110 Telemedicine, Telesurgery, Teleconsultation, Telemonitoring
- B111 IMACS / PACS
- B112 Virtual Reality and 3-D Animations
- B113 Collaboratory Design & Remote Resource Sharing
- B114 Robotics
- B115 Intelligent Agents

B12 NETWORKS & NETWORKING

- B120 Communications Systems
 - B1200 Wireless & Mobile Technologies*
 - B1201 Digital Radios, PCs, & Cable TV*
 - B1202 Broadband Technologies*
 - B1203 Emergency Communications*
 - B1204 Next Generation Internet Initiatives*
 - B1205 Remote Monitoring*
- B121 Health Information Networks
- B122 Intelligent Networks
- B123 Professional Discussion/Consultation
- B124 Integrated Health Care Networks
- B125 Anytime, Anywhere Networks

B13 MEDICAL INFORMATICS

- B130 Clinical & Health Care Information Systems
 - B1300 Decision Support Tools*
 - B1301 Web-based Appliances*
 - B1302 Knowledge Discovery*
 - B1303 Telematics in Health Care*
 - B1304 Universal Access for the Disabled*
 - B1305 Patient Data Repositories & Health Outcome Analysis*
 - B1306 Electronic Health Care Records*
- B131 Public Health Information Systems
 - B1310 Geographic Information Systems*
 - B1311 Knowledge-Based Systems*
 - B1312 Disease Prevention through Global Networks*
 - B1313 Public Health Information Infrastructure*

- B132 Information Technology: Applications & Issues
- B1320 *Ethical, Legal & Socio-Economic Issues*
- B1321 *Telehealth: Certification*
- B1322 *Patient Care Standards, Accreditation*
- B1323 *Authentication, Privacy, Confidentiality, Security...*
- B1324 *Quality of Information, Intelligent Filters*
- B1325 *Access to Information*
- B133 Education, Training & Human Resources
- B1330 *Digital Libraries & Knowledge Repositories*
- B1331 *Collaborative Initiatives*
- B1332 *Human-Machine Interfaces*
- B1333 *Audio-video & multi-media applications*
- B1334 *Content-Based Retrieval Systems*
- B1335 *Patient & Consumer Education*
- B1336 *Distance Learning*

B14 BIO- INFORMATICS

- B140 Molecular Modelling & Dynamics
- B141 Data Mining & Modelling in Genomics
- B142 Drug Development
- B143 Biological Pathways & Systems Modelling
- B144 Knowledge Discovery, Neural Nets & Expert Systems

B15 HIGH PERFORMANCE COMPUTING (HPC)

- B150 HPC Systems
- B1500 *Distributed Computing & Database Systems*
- B1501 *High Confidence Systems & Public Key Infrastructure*
- B1502 *Large Scale Information Management*
- B1503 *Human-Centered Integration & Interoperability*
- B1504 *High-Speed Data Exchange*
- B1505 *Pervasive Computing Devices*
- B151 HPC Applications
- B1510 *Digital Libraries, Knowledge Repositories*
- B1511 *Semantic Interoperability*
- B1512 *Data Warehousing and Mining*
- B1513 *Animation*

B16 ELECTRONIC COMMERCE

- B160 Home Care Management & Reimbursement Structure
- B161 Electronic Exchange of Health-related Information
- B162 Chipcard Technology
- B163 Cooperative Health Networks & Prevention
- B164 Security, Privacy & Confidentiality in Health Transactions

B2 BIO-MODELS, CONTROL & SIMULATION

B20 BIOPHYSICS-BIOMECHANICS MODELS

- B200 BioElectric Models
- B201 Muscle Contractile Dynamics
- B202 Bone, Joint Properties
- B203 Soft Tissue Mechanics
- B204 Sensory Transduction
- B205 Cardio-Vascular System
 - B2050 Cardiac BioElectricity*
 - B2051 CardioVascular Cell Mechanics*
 - B2052 Hemodynamics & Rheology*
 - B2053 Heart Valve Mechanics*
 - B2054 Non-Linear Dynamics, Arrhythmias*
 - B2055 Blood Pressure Control*
- B206 Respiratory Function & Simulation
 - B2060 Lung Mechanics*
 - B2061 Respiratory Function*
 - B2062 Neonatal & Pediatric Aspects*
 - B2063 Ventilation Control*

B21 INPUT-OUTPUT MODELS

- B210 Compartmental Models
 - B2100 Non-Parametric*
 - B2101 Parametric*
 - B2102 Non-linear or time-varying*
- B211 Prior-Knowledge Models
 - B2110 Anatomically-based*
 - B2111 Sub-Process Based*
 - B2112 Non-linear or Time-Varying*
- B212 Control Strategies

B22 MODEL IDENTIFICATION

- B220 Continuous-time methods
- B221 Discrete time methods
- B222 Non-linear systems
- B223 Switched or jump-parameter systems
- B224 Model Structure Detection (complexity)

B23 SIMULATION & MODEL APPLICATIONS

- B230 In diagnosis
- B231 In medical devices
- B232 In health prognosis
- B233 In process automation and control

B3 DEVICES & INSTRUMENTATION

B30 SENSORS, TRANSDUCERS, ELECTRODES

- B300 Design and Development
- B3000 *Standards*
- B3001 *Safety & Hazard Detection*
- B3002 *Calibration*
- B301 Optical Sensors & lasers
- B302 Biochemical Sensors
- B303 Thermal Sensors
- B304 Bio-Electric Sensors
- B305 Micro-machined Electrodes & Sensors

B31 MICRO- & NANO-TECHNOLOGY

- B310 Micro-Technology
- B311 Nano-Technology
- B312 MEMS
- B313 Mechatronics

B32 INSTRUMENTATION

- B320 Medical Robotics
- B321 Scanning or Imaging Hardware
- B3210 *Absorptionmetry (Bone density)*
- B3211 *Fluoroscopy/Angiography*
- B3212 *Impedance*
- B3213 *Infrared*
- B3214 *MRI*
- B3215 *Nuclear/PET*
- B3216 *Optical*
- B3217 *Ultrasound*
- B322 Real-Time Computer Applications
- B3220 *Image-Guided Surgery*
- B3221 *Image-Guided Implants*
- B3222 *Data Acquisition & Storage*

B33 ELECTROMAGNETICS

- B330 Antennas & Fields
- B331 Electro-Magnetic Interference
- B332 Bio-Magnetic Interactions
- B333 Wireless Devices

- B34** **CLINICAL-MEDICAL ENGINEERING**
B340 Surgical Anesthesia Delivery
B341 Drug Delivery Systems
B342 Portable Bio-Monitors
B343 Intensive Care Monitors
B344 Cardiac Fibrillation-Defibrillation
B345 Power Sources

- B35** **ARTIFICIAL ORGANS (INSTRUMENTS)**
B350 Heart Valves
B351 Heart/Ventricular Support
B352 Lung, Ventilation
B353 Liver
B354 Kidney, Dialysis machines

B4 NEUROENGINEERING

B40 BIOELECTRIC SIGNALS & NETWORKS

- B400 Conductive cell characteristics
 - B4000 *Conductive membranes*
 - B4001 *Neurotransmitters & Interactions*
 - B4002 *Bioelectric Fields*
- B401 Biological Neural Networks
 - B4010 *Learning*
 - B4011 *Adaptation*
 - B4012 *Sensory Fusion*
 - B4013 *Sensory-Motor Mapping*
- B402 Bioelectric information coding
 - B4020 *Spatial-temporal coding*
 - B4021 *Information Processing*
 - B4022 *Chaos and noise advantages*

B41 SENSORY PROCESSING

- B410 Visual processing, oculomotor
 - B4100 *Retinal circuits*
 - B4101 *Cortical circuits*
 - B4102 *Accommodation*
 - B4103 *Lens Control*
- B411 Sound & Motion processing
 - B4110 *Haircell transduction*
 - B4111 *Hearing (External ear, Middle ear, ossicles)*
 - B4112 *Hearing (Labyrinth, cochlea)*
 - B4113 *Vestibular System (rotation)*
 - B4114 *Vestibular System (gravity, linear motion)*
- B412 Neuro-Chemical Sensors
 - B4120 *Smell*
 - B4121 *Pain*

B42 NEURAL INTERFACES

- B420 Sensory implants (visual, cochlea)
- B421 Spinal Neuro-motor interfaces (FES)
- B422 Therapeutic Cortical stimulation
- B423 Deep Brain Stimulation (DBS)

B43 HOMEOSTASIS

- B430 Body Temperature Control
- B431 Blood Pressure Control
- B432 Biorythms
- B433 Blood Gas Concentration

B5 SENSORY-MOTOR SYSTEMS AND REHABILITATION

B50 SENSORY-MOTOR SYSTEMS

- B500 Eye & Head Orientation
- B5000 *Ocular reflexes & control*
- B5001 *Auditory reflexes*
- B5002 *Head Control*
- B5003 *Eye-Head coordination*
- B501 Limb Control
- B5010 *Planning Movements*
- B5011 *Multi-limb Coordination*
- B5012 *Hierarchical control*
- B5013 *Postural Reflexes*
- B5014 *CNS remapping*

B51 REHABILITATION

- B510 Strokes
- B511 Brain Injury
- B512 Basal Ganglia Disorders (Parkinson, Huntington...)
- B513 Spinal Cord Injury
- B514 Muscle Disorders
- B515 Therapeutic Trials

B52 MOBILITY & SENSORY AIDS

- B520 Adapted Vehicles
- B521 Wheelchairs
- B522 Orthotics, braces
- B523 Voice-electronic interfaces
- B524 Visual aids
- B525 Hearing aids (non-invasive)
- B526 Computer-generated speech

B53 PROSTHETICS

- B530 Artificial joints
- B531 Artificial limbs
- B532 Myo-electric devices

B54 PHYSICAL & OCCUPATIONAL THERAPY

B6 CELLS TO ORGANS ENGINEERING

B60 MOLECULAR ENG.

- B600 Genomics
- B601 BioComputing
- B602 Molecular Structures
- B603 Molecular Electronics
- B604 Nucleic Acids
- B605 Protein Engineering
- B606 Supramolecular Architecture

B61 CELL & TISSUE ENG.

- B610 Bio-Compatibility
- B611 Mathematical Models
- B612 Mechano-Transduction & Cell Adhesion
 - B6120 Cell Adhesion*
 - B6121 Scaffolds for Cell Growth*
 - B6122 Cell-Cell Interactions*
 - B6123 Cell Surface Eng.*
- B613 Clinical/Environmental Applications
 - B6130 Gene Therapy*
 - B6131 Biosensors w/Molecular & Cellular Devices*
 - B6132 Tissue Replacement*
 - B6133 Bioreactors*
- B614 Nanotechnology
 - B6140 For Implant Surface Eng.*
 - B6141 For Biocompatibility*

B62 BIOMATERIALS

- B620 Implants
- B621 Sterilization
- B622 BioCeramics
- B623 Polymers & Alloys

B63 ARTIFICIAL CELLS & ORGANS (BIO)

- B630 Encapsulated drug delivery
- B631 Artificial membranes
 - B6310 Guided Growth or Repair*
 - B6311 Not-Elsewhere Classified (NEC)*
- B632 Encapsulated live cells
 - B6320 Organ function support*
 - B6321 Biochemical process support*