Index

adaptive control 163,239,265
analytical redundancy 402
applications
  fault diagnosis in process operations 401
  flight control, AUTOCREW 371
  fluidized catalytic cracker 407
  intelligent robot prehension 319
  machining workstation 31
  multi-sensory robotic systems 350
  pole and cart system 229,287
  robotics 83-84,319
  space laboratory 72-76
  space vehicles 7-10
  spray-casting machine 132
architectures
  approximate reasoning-based intelligent control (ARIC) 227
  COPER/IC 269
  distributed intelligence systems 116
  for learning control, 253,269
  functional 8-9
  model-based 58
  multiresolutional 131
  reference model 27
  sensor controller 364
  variable structure 119
autonomous system, autonomy 1
  architecture for 8-9,58
  control functions 2
  degrees of, 1
  generation of 62
cerebellar model arithmetic computer (CMAC) 28-29
certainty 411
clustering 415,416
compiled knowledge 407
coordination 82
coordination level 7-10,13-16,350
dexterity 19
dextrous grasp synthesis 334
diagnosis, failure
  diagnostically focused simulation 407,412
  establish-refine strategy 410
  framework 404,419
  functional decomposition 407
  HEAP applied to, 70-71
  information processing tasks 401,403,408,419
  interacting malfunctions 412
  model-based 60

multiple malfunctions 412
qualitative interpretation 407,413
robotic systems 349
root-cause diagnosis 404
structured pattern matching 407,410
distributed intelligence
distributed control systems 182,401
distributed intelligence systems 109
distributed intelligent control 79
endomorphism 60
execution level 7-12,145,350
expert systems 124,169
AUTOCREW 371
real-time issues 389
expert control 167
failure diagnosis, see diagnosis
future research directions 21-23,55,72,183-184, 232-233 277-279,315,345,366-367, 396-398
fuzzy control 180,216
applications 223
architecture 216
defuzzification 220
fuzzification 217
fuzzy inference 219-220
hierarchical 220-223
hybrid fuzzy and neural controllers 227
rule-base 218
stability analysis 223
fuzzy logic 216,402
gain scheduling 239
generic tasks 403
hierarchical classification 407
hierarchical encapsulation and abstraction principle (HEAP) 66
hierarchies, hierarchical control
agents 69-71
control flow in, 96-98
functionality assignment 84
hierarchical fuzzy control 220-223
local and global feedback 99
models 21
nested 129
organization of, 81
real-time control sytem 34
sensory processing hierarchy 52
structure-based 80
three-level 7-10
hypothesis assembly 407,418
information processing tasks 401,403,408,419
integrated control 322
intelligent control

evolution 3,5-6,19-20,28-30,131,265
principles 18-20
real-time operation 27
intelligent node 112
information fusion 113
response selection 113
situation assessment 113
knowledge base / data base
AUTOCREW 376
RCS 42
knowledge base cooperation 386
model-based autonmous system architecture 58
knowledge structuring 171
lattice algorithm 119
learning, learning systems, learning control
applications 253
definition 238
generalization 249
hybrid fuzzy and neural controllers 227
inductive inference and inductive learning 306
learning as automatic function synthesis 249
learning to partition the state space 308
learning vs. adaptation 241
machine-learned control 307
passive learning 298
pattern recognition 243
Q-learning 226
reinforcement learning in control 225,274
spatially localized learning 252
temporal difference methods 226
training sample fixation 252
uncertainty 239
management and organization level 7-10,16-18
mathematical models
abstractness / granularity 19
colored Petri nets 113
construction 64
discrete event system 20-21,57,206
hierarchical systems 80
hybrid system 20-21
Petri nets 113
task-base model development 66
topological model 324
metadecisions 124
multi-fingered robot hand 320
NASREM 31
neural networks, neural control
applications 253
ARIC control 227
associative memory 248

backpropagation 298
connectionist sytems 248,251
fault diagnosis 402,415
Generalized ARIC 229
hybrid fuzzy and neural controllers 227
neural and machine learned control 311
performance measures
accuracy 120
consistency of information 122
coordination 122
synchronization 121
timeliness 120
work load metrics 391
Petri nets 113
colored 113
transitions 113
PID 165
planning, planning systems
AI feedback planning systems 204
applications 208-212
control theoretic perspective 197
controllability / reachability 199
distributed intelligent control 79
elements of, 193-196
expert control 170
HEAP applied to, 69
model-based 59
modeling and analysis, 191
nested heirarchies 140
observability 200
open loop AI planning systems 202
optimal plan generation 208
plan generation 63
RCS 34
replanning 101-104
stability 201
qualtitative representations 273
restructurable control 267
role 112
search
A* 39
low/high resolutional 152-157
nested hierarchical 150
sensors
sensor fusion 354,361
sensor validation 407,416
sensory processing 48
sensory processing hierarchy 52
sensory processing modules 49
simulation 21

symbolic / numeric interface 20,23,323,338
task decomposition 31,37,95
timing issues
    hierarchies 19
    RCS 34
topological reasoning 331
value judgements 29, 52-54,97
vision system 351
world model, world modeling 29,40