# Index

#### A

Activation, 244–248 Actuator, 324–328 Actuator force control, 176–198 Actuator-sensor-environment, 182–195 Android, 453, 454, 455, 470, 475 ARM processor, 483–497 Axon model, 104

# B

Biological cell assembly, 30–33 Boundary detector, 463–464

## С

Cell body model, 99–104 Compass model, 41–43 Contact manipulation, 23–28 Continuous learning, 69–93 CPG-based locomotion control system, 38–39

# D

Dead reckoning, 373–375 Degrees of freedom (dof), 113, 139, 146, 389 Derivative-free, 277–279, 298–304, 308 Differential flatness, 278, 288–293 Discrete circuit, 101, 108

### E

Encoder, 154, 316, 317, 323, 328–330 Ethernet, 392

# F

Fixed based manipulator, 265–269 Flat system, 279, 288–293

#### G

Graphical user interface (GUI), 347–356 Group theory, 115, 120–122

### Н

Hall sensor, 223 Holbos, 423–447

# I

Interlimb coordination, 60 Intralimb coordination, 39, 40 600 Interdisciplinary Mechatronics

#### J

Jacobian algorithm, 259–265

# K

Kinect, 434, 551, 564 Kinematic model, 426–430 Kinetostatic performance, 131–138

### L

Lie algebra, 282–288 Limb, 113–124

#### Μ

Maze model, 75–80, 84, 85, 90–92 Memory effect, 228, 230, 240 MEMS, 6, 371, 552 Micro-nanomechatronics, 19–33 Micro-organism, 25 MIMO, 163–204 Mobile base manipulator, 269–272 Mobile device, 451–476 Modified transpose Jacobian (MTJ), 255, 257 MOEMS, 6 Multiple impedance control (MIC), 261

# Ν

Non-contact manipulation, 23, 28 Nonlinear system, 282, 283, 288, 289, 292, 536

#### 0

On-board controller, 389, 391, 440

#### Р

Parallel mechanism, 171–175 Parallel robot, 163–204 Parallel wrist, 113–141
Permanent magnet synchronous generator (PMSG), 277, 279–282
Phase regulation, 40
Phase resetting, 37–64
Photo-linkable resin, 26, 30–33
Product development, 513–525
Proportional-integral derivative (PID), 149, 495
Pulse width modulation (PWM), 95, 323, 393, 440
Pulse-type hardware, 95–109
PWM servo motor, 97–98

#### R

RehabRoby, 145–159 Reusable, 91 RGB, 434 Robot-assisted rehabilitation system, 145–159 Rotor, 183, 280, 281, 299, 305, 308, 402, 403

# S

Scanning laser, 369–382 Screw theory, 113, 115 Sensory regulation, 40–41 Shape memory alloys (SMA), 227–251 Signal processing, 6, 176, 217, 218–219, 371, 406 Single cell analysis, 20, 25, 26, 28, 30–33 Single machine infinite bus (SMIB), 279, 280 SLAM, 370 Superelastic, 228, 230–231 Synaptic model, 103

Index 601

# Т

3D reconstruction, 554–556 Transpose Jacobian control (TJ), 255–272 Tuned modified transpose Jacobian control (TMTJ), 255–272

# U

Ultrasonic positioning system, 375–377, 379, 380 Unknown usage, 91, 92 Upper extremities, 146, 148

Virtual laboratory, 247–352

#### W

V

Wheel-based, 385–415 Wi-Fi, 389, 390, 392, 393