Contents

SECTION I Overview of Mechatronics

1 What is Mechatronics? *Robert H. Bishop and M. K. Ramasubramanian*

2 Mechatronic Design Approach *Rolf Isermann*

3 System Interfacing, Instrumentation, and Control Systems *Rick Homkes*

4 Microprocessor-Based Controllers and Microelectronics *Ondrej Novak and Ivan Dolezal*

5 An Introduction to Micro- and Nanotechnology *Michael Goldfarb, Alvin Strauss and Eric J. Barth*

6 Mechatronics: New Directions in Nano-, Micro-, and Mini-Scale Electromechanical Systems Design, and Engineering Curriculum Development *Sergey Edward Lyshevski*

SECTION II Physical System Modeling

7 Modeling Electromechanical Systems *Francis C. Moon*

8 Structures and Materials *Eniko T. Enikov*

9 Modeling of Mechanical Systems for Mechatronics Applications *Raul G. Longoria*

©2002 CRC Press LLC

10 Fluid Power Systems *Qin Zhang and Carroll E. Goering*

11 Electrical Engineering *Giorgio Rizzoni*

12 Engineering Thermodynamics *Michael J. Moran*

13 Modeling and Simulation for MEMS *Carla Purdy*

14 Rotational and Translational Microelectromechanical Systems: MEMS Synthesis, Microfabrication, Analysis, and Optimization *Sergey Edward Lyshevski*

15 The Physical Basis of Analogies in Physical System Models *Neville Hogan and Peter C. Breedveld*

SECTION III Sensors and Actuators

16 Introduction to Sensors and Actuators *M. Anjanappa, K. Datta and T. Song*

17 Fundamentals of Time and Frequency *Michael A. Lombardi*

18 Sensor and Actuator Characteristics *Joey Parker*

19 Sensors
- 19.1 Linear and Rotational Sensors *Kevin Lynch and Michael Peshkin*
- 19.2 Acceleration Sensors *Halit Eren*
- 19.3 Force Measurement *M. A. Elbestawi*
- 19.4 Torque and Power Measurement *Ivan Garshelis*
- 19.5 Flow Measurement *Richard Thorn*
- 19.6 Temperature Measurements *Pamela Norris and Bouvard Hosticka*
- 19.7 Distance Measuring and Proximity Sensors *J. Fernando Figueroa*
- 19.8 Light Detection, Image, and Vision Systems *Stanley Ipson*
- 19.9 Integrated Microsensors *Chang Liu*

20 Actuators
- 20.1 Electromechanical Actuators *George T.-C. Chiu*
- 20.2 Electrical Machines *Charles Fraser*
- 20.3 Piezoelectric Actuators *Habil Ramutis Bansevicius and Rymanta Tadas Tolocka*

©2002 CRC Press LLC

20.4 Hydraulic and Pneumatic Actuation Systems *Massimo Sorli and Stefano Pastorelli*
20.5 MEMS: Microtransducers Analysis, Design, and Fabrication *Sergey Lyshevski*

SECTION IV Systems and Controls

21 The Role of Controls in Mechatronics *Job van Amerongen*

22 The Role of Modeling in Mechatronics Design *Jeffrey A. Jalkio*

23 Signals and Systems
23.1 Continuous- and Discrete-Time Signals *Momoh Jimoh Salami*
23.2 *z* Transform and Digital Systems *Rolf Johansson*
23.3 Continuous- and Discrete-Time State-Space Models *Kam Leang, Qingze Zou, and Santosh Devasia*
23.4 Transfer Functions and Laplace Transforms *C. Nelson Dorny*

24 State Space Analysis and System Properties *Mario E. Salgado and Juan I. Yuz*

25 Response of Dynamic Systems *Raymond de Callafon*

26 The Root Locus Method *Hitay Özbay*

27 Frequency Response Methods *Jyh-Jong Sheen*

28 Kalman Filters as Dynamic System State Observers *Timothy P. Crain II*

29 Digital Signal Processing for Mechatronic Applications *Bonnie S. Heck and Thomas R. Kurfess*

30 Control System Design Via $\mathcal{H}^2$ Optimization *Armando A. Rodriguez*

31 Adaptive and Nonlinear Control Design *Maruthi R. Akella*

32 Neural Networks and Fuzzy Systems *Bogdan M. Wilamowski*

©2002 CRC Press LLC

33 Advanced Control of an Electrohydraulic Axis *Florin Ionescu, Crina Vlad and Dragos Arotaritei*

34 Design Optimization of Mechatronic Systems *Tomas Brezina, Ctirad Kratochvil, and Cestmir Ondrusek*

SECTION V Computers and Logic Systems

35 Introduction to Computers and Logic Systems *Kevin Craig and Fred Stolfi*

36 Digital Logic Concepts and Combinational Logic Design *George I. Cohn*

37 System Interfaces *M.J. Tordon and J. Katupitiya*

38 Communications and Computer Networks *Mohammad Ilyas*

39 Fault Analysis in Mechatronic Systems *Leila Notash and Thomas N. Moore*

40 Logic System Design *M. K. Ramasubramanian*

41 Synchronous and Asynchronous Sequential Systems *Sami A. Al-Arian*

42 Architecture *Daniel A. Connors and Wen-mei W. Hwu*

43 Control with Embedded Computers and Programmable Logic Controllers *Hugh Jack and Andrew Sterian*

SECTION VI Software and Data Acquisition

44 Introduction to Data Acquistition *Jace Curtis*

45 Measurement Techniques: Sensors and Transducers *Cecil Harrison*

©2002 CRC Press LLC

46 A/D and D/A Conversion *Mike Tyler*

47 Signal Conditioning *Stephen A. Dyer*

48 Computer-Based Instrumentation Systems *Kris Fuller*

49 Software Design and Development *Margaret H. Hamilton*

50 Data Recording and Logging *Tom Magruder*

©2002 CRC Press LLC