Contents

Foreword by Max V. Mathews xi
Preface xiii
Acknowledgments xv
Introduction xxi

C Programming Basics

0 An Overview of the C Language with Some Elements of C++ 3
Victor Lazzarini and Richard Boulanger

1 Programming in C 55
Richard Dobson

Audio Programming Basics

2 Audio Programming in C 185
Richard Dobson

3 Working with Audio Streams 329
Gabriel Maldonado

4 Introduction to Program Design 383
John ffitch

Audio Programming Essentials

5 Introduction to Digital Audio Signals 431
Victor Lazzarini

6 Time-Domain Audio Programming 463
Victor Lazzarini
Spectral Audio Programming

7 Spectral Audio Programming Basics: The DFT, the FFT, and Convolution 521
Victor Lazzarini

8 The STFT and Spectral Processing 539
Victor Lazzarini

9 Programming the Phase Vocoder 557
Victor Lazzarini

Programming Csound Opcodes

10 Understanding an Opcode in Csound 581
John ffitch

11 Spectral Opcodes 617
Victor Lazzarini

Algorithmic Synthesis and Music Programming

12 A Modular Synthesizer Simulation Program 629
Eric Lyon

13 Using C to Generate Scores 655
John ffitch

14 Modeling Orchestral Composition 677
Steven Yi

Appendixes

A Command-Line Tools Reference 697
Jonathan Bailey

B Debugging Software with the GNU Debugger 719
Jonathan Bailey

C Soundfiles, Soundfile Formats, and libsndfile 739
Victor Lazzarini

D An Introduction to Real-Time Audio IO with PortAudio 771
Victor Lazzarini

E MIDI Programming with PortMIDI 783
Victor Lazzarini