

the computer music tutorial <sup>second edition</sup> Curtis Roads

Expanded, updated, and fully revised, the definitive introduction to electronic music is ready for a new generation of students.

• Seven new chapters cover up-to-date topics including virtual analog, pulsar synthesis, concatenative synthesis, spectrum analysis by atomic decomposition, Open Sound Control, spectrum editors, and instrument and patch editors.

• Appendix on machine learning added.

• Hundreds of new figures and references added to the original charts, diagrams, screen images, and photographs to explain basic concepts and terms.

• Twenty-five years of classroom, seminar, and workshop use inform the text's pace and level.

• Mathematical notation and program code examples used only when necessary

## **The Computer Music Tutorial**

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# **Second Edition Contents**

#### **PART I: Digital Audio**

- 1 History of Digital Audio
- 2 Basics of Sound Signals
- 3 Theory of Sampling4 Sample Quantization
  - Sample Quantization, Conversion, and Audio Formats

# PART II: Introduction to Sound Synthesis

- 5 History of Digital Sound Synthesis
- 6 Wavetable Lookup Synthesis
- 7 Time-Varying Waveform Synthesis
- 8 Software Synthesis

# **PART III: Sound Synthesis**

- 9 Sampling
- 10 Additive Synthesis (new section on additive synthesis using machine learning)
- 11 Multiple Wavetable Synthesis
- 12 Wave Terrain Synthesis
- 13 Granular Synthesis
- 14 Subtractive Synthesis (new sections on filter banks and vocoders)
- 15 Modulation I: RM, SMM, and AM (*new section on single-sideband modulation*)
- 16 Modulation II: FM, PM, PD, and GM
- 17 Waveshaping Synthesis (new section on wavefolding)
- 18 Physical Modeling Synthesis (new sections on piano models and scanned synthesis)
- 19 **NEW** Virtual Analogy
- 20 Formant Synthesis
- 21 **NEW** Pulsar Synthesis
- 22 Waveform Segment Synthesis (new section on fractal interpolation synthesis)
- 23 NEW Concatenative Synthesis
- 24 Graphic Sound Synthesis
- 25 Noise, Chaotic, and Stochastic Synthesis

### **PART IV: Mixing and Signal Processing**

- 26 Sound Mixing
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- 28 Digital Filtering
- 29 Convolution (new section on dynamic convolution)
- 30 Time Delay Effects
- 31 Pitch-Time Changing
- 32 Sound Spatialization (new sections on immersive sound including vector base amplitude panning [VBAP], ambisonics, and wave field synthesis — and transmission formats for multichannel sound)
- 33 Reverberation

# **PART V: Sound Analysis**

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- 44 **NEW** Spectrum Editors
- 45 Common Music Notation Editors
- 46 Unconventional Score Editors
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- 48 Languages for Sound Synthesis
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- 50 Algorithmic Composition

#### **PART VII: Interconnections**

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- 52 NEW Open Sound Control (OSC)

**NEW** Appendix A: Machine Learning