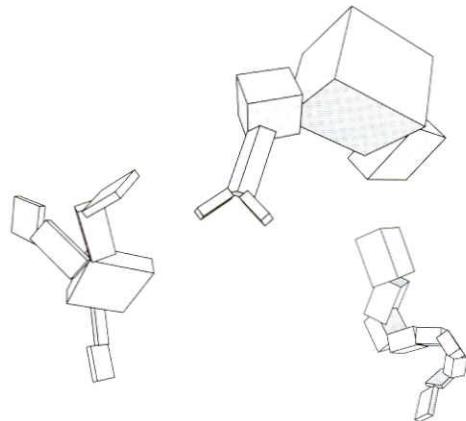


Contents



Preface x

SECTION I. INTRODUCTION

CHAPTER 1

Animation, Visual Effects, and Technology in Context 3

Summary 3

1.1 A Digital Creative Environment 3

1.2 The Development of the Technology 5

1.3 Visual Milestones: 1960–1989 16

1.4 Visual Milestones: 1990–1999 23

1.5 Visual Milestones: 2000–Today 31

1.6 Timeline Charts 36

Key Terms 48

CHAPTER 2

Creative Development and the Digital Process 49

Summary 49

2.1 Storytelling 49

2.2 Character Design 58

2.3 Visual and Look Development 59

2.4 Production Strategies 60

2.5 The Digital Computer Animation Studio 65

2.6 Creative, Technical, and Production Teams 69

2.7 The Production Process of Computer Animation 77

2.8 Getting Started 86

Key Terms 90

SECTION II. MODELING

CHAPTER 3

Modeling Concepts 93

Summary 93

3.1 Space, Objects, and Structures 93

3.2 Building with Numbers 96

3.3 Vertices, Edges, and Facets 98

3.4 Moving Things Around 99

3.5 File Formats for Modeling 104

3.6 Getting Ready 106

Key Terms 114

CHAPTER 4

Modeling Techniques 115

Summary 115

4.1 Introduction 115

4.2 Curved Lines 116

4.3 Geometric Primitives 118

4.4 Sweeping 121

4.5 Free-Form Objects 123

4.6 Basic Modeling Utilities 126

4.7 Real-Time Polygonal Models 132

Key Terms 138

CHAPTER 5

Advanced Modeling and Rigging Techniques 139

Summary 139

5.1 Free-Form Curved Surfaces 139

5.2 Subdivision Surfaces 145

5.3 Logical Operators and Trimmed Surfaces 146

5.4 Advanced Modeling Utilities 147

5.5	Procedural Descriptions and Physical Simulations	149
5.6	Photogrammetry and Image-Based Modeling	157
5.7	Animation Rigging and Hierarchical Structures	158
5.8	Getting Ready	163
	Key Terms	166

SECTION III. RENDERING

CHAPTER 6

Rendering Concepts

	Summary	169
6.1	Lights, Camera, and Materials	169
6.2	Color Models	172
6.3	Steps in the Rendering Process	175
6.4	Hidden Surface Removal	177
6.5	Z-Buffer	178
6.6	Ray Tracing	179
6.7	Global Illumination and Radiosity	181
6.8	Image-Based Lighting	183
6.9	Non-Photorealistic Rendering	188
6.10	Hardware Rendering	190
6.11	File Formats for Rendered Images	194
6.12	Getting Ready	196
	Key Terms	201

CHAPTER 7

The Camera

Summary	203	
7.1	Types of Cameras	203
7.2	The Pyramid of Vision	204
7.3	Types of Camera Shots	208
7.4	Types of Camera Lenses	214
7.5	Camera Animation	216
7.6	Getting Ready	217
	Key Terms	220

CHAPTER 8

Lighting

Summary	221	
8.1	Lighting Strategies and Mood	221
8.2	Types of Light Sources	226
8.3	Basic Components of a Light Source	230
8.4	Lighting the Scene	235
8.5	Basic Positions of Light Sources	241
8.6	Getting Ready	244
	Key Terms	249

CHAPTER 9

Shading and Surface Characteristics

Summary	251	
9.1	Surface Shading Techniques	251
	Summary	333
11.1	Keyframe Interpolation and Parameter Curves	333
11.2	Forward Kinematics and Model Animation	337

9.2	Surface Shaders and Multi-Pass Rendering	254
-----	--	-----

9.3	Image Mapping	256
-----	---------------	-----

9.4	Surface Reflectivity	267
-----	----------------------	-----

9.5	Surface Color	274
-----	---------------	-----

9.6	Surface Texture	276
-----	-----------------	-----

9.7	Surface Transparency	280
-----	----------------------	-----

9.8	Environment-Dependent Shading	281
-----	-------------------------------	-----

9.9	Getting Ready	284
-----	---------------	-----

	Key Terms	292
--	-----------	-----

SECTION IV. ANIMATION AND EFFECTS

CHAPTER 10

Principles of Animation

	Summary	295
--	---------	-----

10.1	The Craft of Animation	295
------	------------------------	-----

10.2	The Twelve Principles	305
------	-----------------------	-----

10.3	Half-a-Dozen More Principles	310
------	------------------------------	-----

10.4	Character Development	318
------	-----------------------	-----

10.5	Storyboarding	326
------	---------------	-----

	Key Terms	331
--	-----------	-----

CHAPTER 11

Computer Animation Techniques

	Summary	333
--	---------	-----

11.1	Keyframe Interpolation and Parameter Curves	333
------	---	-----

11.2	Forward Kinematics and Model Animation	337
------	--	-----

11.3 Camera Animation	343
11.4 Light Animation	348
11.5 Hierarchical Character Animation	352
11.6 Two- and Three-Dimensional Integration	356
11.7 Animation File Formats	358
11.8 Getting Ready	358
Key Terms	361

CHAPTER 12

Advanced Computer Animation Techniques

Summary	363
12.1 Inverse Kinematics	363
12.2 Performance Animation and Motion Capture	366
12.3 Dynamics Simulations	374
12.4 Procedural Animation	382
12.5 Facial Animation	390
12.6 Crowd Animation	394
12.7 Interactive Animation	396
Key Terms	404

CHAPTER 13

Visual Effects Techniques

Summary	405
13.1 Basic Concepts of Digital Visual Effects	405
13.2 Camera Tracking	413
13.3 Rotoscoping	414
13.4 Blue and Green Screens	414

13.5 Set and Character Extensions	419
13.6 Computer-Generated Particles	420
13.7 Crowd Replication	420
13.8 Three-Dimensional Morphing	421
13.9 Motion Control	422
13.10 Motion Capture and Virtual Characters	423
13.11 Photogrammetry	423
13.12 Practical Effects	424
Key Terms	426

SECTION V. COMPOSING AND OUTPUT

CHAPTER 14

Retouching, Compositing, and Color Grading

Summary	429
14.1 Basic Concepts of Image Manipulation	429
14.2 Image Retouching	437
14.3 Image Compositing and Blending	442
14.4 Image Sequencing	447
14.5 Color Grading	452
Key Terms	454

CHAPTER 15

Image Resolution and Output

Summary	455
15.1 Basic Concepts of Digital Output	455
15.2 Image Resolution	456
15.3 Image File Formats and Aspect Ratios	463
15.4 Output on Paper	469
15.5 Output on Photographic Media	471
15.6 Output on Video	472
15.7 Output on Digital Media	475
15.8 Output on Three-Dimensional Media	478
Key Terms	480

INDEX

481

