Table of Contents

Preface 1

Chapter 1: Introduction to AI 5

Artificial Intelligence (AI) 5
AI in games 6
AI techniques 7
Finite State Machines (FSM) 7
Random and probability in AI 9
The sensor system 10
Polling 10
The messaging system 10
Flocking, swarming, and herding 11
Path following and steering 12
A* pathfinding 13
A navigation mesh 20
The behavior trees 23
Locomotion 25
Dijkstra's algorithm 28
Summary 28

Chapter 2: Finite State Machines 29

The player's tank 30
The PlayerTankController class 30
Initialization 31
Shooting bullet 32
Controlling the tank 32
The bullet class 35
Setting up waypoints 37
The abstract FSM class 38

The enemy tank AI 39
The patrol state 42
The chase state 43
The attack state 44
The dead state 45
Taking damage 46
Using an FSM framework 47
The AdvanceFSM class 48
The FSMState class 49
The state classes 50
The PatrolState class 50
The NPCTankController class 52
Summary 54
Chapter 3: Random and Probability 55
Random 56
Random class 56
Simple random dice game 57
Definition of probability 58
Independent and related events 59
Conditional probability 59
A loaded dice 60
Character personalities 61
FSM with probability 62
Dynamic AI 64
Demo slot machine 65
Random slot machine 65
Weighted probability 69
Near miss 73
Summary 74
Chapter 4: Implementing Sensors 75
Basic sensory systems 76
Scene setup 76
Player tank and aspect 78
Player tank 79
Aspect 81
AI character 81
Sense 83
Perspective 83
Touch 86
Testing 88
Summary 88

Chapter 5: Flocking 89
Flocking from Unity's Island Demo 89
Individual Behavior 90
Controller 97
Alternative implementation 99
FlockController 101
Summary 106
Chapter 6: Path Following and Steering Behaviors 107
Following a path 108
Path script 110
Path follower 111
Avoiding obstacles 114
Adding a custom layer 116
Obstacle avoidance 117
Summary 121
Chapter 7: A* Pathfinding 123
A* algorithm revisit 123
Implementation 124
Node 125
PriorityQueue 126
GridManager 127
AStar 132
TestCode class 135
Scene setup 137
Testing 141
Summary 142
Chapter 8: Navigation Mesh 143
Introduction 144
Setting up the map 144
Navigation Static 145
Baking the navigation mesh 145
Nav Mesh Agent 146
Updating agents' destinations 148
Scene with slope 149
NavMeshLayers 151
Off Mesh Links 153
Generated Off Mesh Links 154
Manual Off Mesh Links 156
Summary 158

Chapter 9: Behavior Trees 159
Behave plugin 160
Workflow 161
Action 164
Interfacing with the script 166
Decorator 169
Behave debugger 171
Sequence 172
Exploring Behave results 173
Selector 175
Priority selector 177
Parallel 179
Reference 181
The Robots versus Aliens project 181
Summary 184
Chapter 10: Putting It All Together 185
Scene setup 186
Tags and layers 188
Vehicles 189
Player car controller 190
AI Car Controller 192
Finite State Machines (FSMs) 194
Patrol state 195
Chase state 197
Attack state 198
Weapons 199
Gun 200
Bullet 201
Launcher 203
Missile 205
Summary 208
Index 209