CONTENTS

About the Author	xix
Acknowledgments	
Preface to the Second Edition	xxiii
Preface to the First Edition	<i>xxv</i>

Part One Fundamentals ... 1

Chapter 1

Getting Started ... 3

Robotics Invention System
Software
NQC Quick Start
Using BricxCC
Using MacNQC
Using NQC for Windows
The START Program 15
The View Button13
Attaching Motors
Debugging
Moving On

The RCX . . . 17

The Hardware ₁₇
Firmware19
Tasks and Subroutines19
Output Ports
Sensors
Boolean Values22
Sensor Modes24
Sensor Types
Other Capabilities31
Sound31
Keeping Time31
Variables32
Datalog
Automatic Power Down32
Conclusion

Introduction to NQC . . . 35

A Simple Program35
Controlling Outputs38
Miscellaneous Commands40
Using #define41
Using Sensors43
Using Variables45
Expressions46
Conditions48
Control Structures50
Using Tasks52
Functions53
Displaying Values58
Events 61
Conclusion

Construction . . . 65

Structures
Frames65
Long Beams67
Vertical Beams68
Bracing69
Wide Beams70
Basic Gears
Gear Reduction71
Speed and Torque72
Compound Gear Trains74
Distances Between Gears75
Specialized Gears76
Crown and Bevel Gears77
Worm Gear77
The Rack79
The Differential80
The Clutch Gear81
Pulleys and Belts
Ratchets84
A Simple Ratchet84
The Ratchet Splitter85
Levers
Conclusion89

Part Two

Robots ... 91

Chapter 5

Tankbot ... 93

Construction	93
Driving Straight	98
Turning	
Conclusion	

Chapter 6

Bumpbot . . . 105

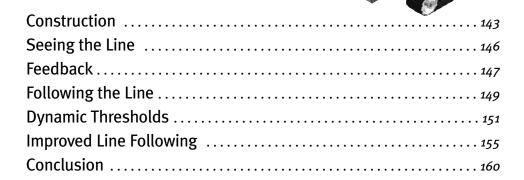


Bugbot ... 117

Construction	
RCX Code Blocks	
An Event-Based Experiment	
A Condition-Based Experiment	
Multiple Watchers	
Synchronous Behavior	
Stuck in a Corner	
Tuning the Corner Detector	140
Conclusion	

Chapter 8

Linebot ... 143



B.		- L			
	1111	0101	MT.		161
			UL		TOT

Construction	161
Delivering Cargo	166
Conclusion	169

Chapter 10

Scanbot ... 171

Construction	172
Looking and Steering	176
Improving the Scanbot Program	183
Using Scanbot When Space Is Limited	191
Conclusion	105

Chapter 11

Tribot . . . 197

The Swivel Wheel	197
Construction	198
Programming	202
Variations	

Onebot . . . 205

Driving with One Motor	205
Construction	206
Programming	210
Conclusion	211

Chapter 13

Steerbot ... 213

Rack and Pinion Steering	
Chassis Construction	214
Programming	
Asynchronous Steering	
Conclusion	

Chapter 14

Diffbot . . . 233

Dual-Differential Drive	234
Constructing the Remote	239
Programming the Remote	242
Conclusion	246

Brick Sorter ... 247

Construction	247
Programming	254
Sorting	257
Conclusion	257

Chapter 16

Vending Machine . . . 259

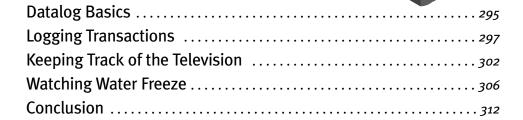
Construction	259
Theory of Operation	267
Programming in RCX Code	267
Programming in NQC	269
Testing	277
Conclusion	278

Chapter 17

Communication . . . 279

Reprogrammed Vending Machine	280
Candy Dispenser	284
Delivery Truck	288
Programming Delivery Truck in RCX Code	289
Programming Delivery Truck in NQC	290
Testing	293
Conclusion	294

Using the Datalog . . . 295



Chapter 19

Roboarm ... 313

The Base	314
The Arm	318
The Body	325
Basic Operations	333
Starting Position	335
The Test Mat	338
Cleaning Up	339
Lining Up	342
Conclusion	348

	_		
			
			1477
ı u			

Appendixes ... 349

Appendix A:

MINDSTORMS Sets . . . 351

Retail Base Sets	352
Retail Expansion Sets	354
Educational Sets	356
Accessories	357

Appendix B:

Supplementary Parts . . . 359

Appendix C:

Programming Tools . . . 363

RCX Code363
NQC364
ROBOLAB
MindScript and LASM365
Custom Firmware366

AD	pen	dix	D:
NP.	P < 11	M 17	

NQC Quick Reference . . . 367

The NQC Language	 	 367
The NOC API	 	 370

Appendix E:

Online Resources . . . 381

General Information	
Shopping	382
Programming Tools and Advanced Topics	382
Afterword	381
Index	384