CONTENTS IN DETAIL

ACKNOWLEDGMENTS	XVII
INTRODUCTION	XIX
About This Book	
Experiments	
Projects	xxi
Code and Resources	xxii
1	
GETTING STARTED	1
A Tour of the Micro:bit	2
The Top	$\dots \dots \dots 2$
The Bottom	4
Power and the Micro:bit	4
Connecting Electronics with Input/Output Pins	7
Built-In Peripherals	
Hardware Essentials	$\dots\dots\dots10$
Programming the Micro:bit	$\dots\dots\dots11$
Connecting your Micro:bit	11
Programming with Blocks: Hello World	12
Programming with MicroPython: Hello World	19
Programming Concepts	$\dots \dots 25$
Variables	$\dots \dots 25$
Arithmetic	27
if Blocks	29
Strings	30
Arrays and Lists	32
Programming Wrap-Up	33
Downloading the Code	34
Downloading the Blocks Code	34
Downloading the MicroPython Code	
Summary	37

2
SUPER SONIC 39
Connecting a Loudspeaker to a Micro:bit
The Quiet Method: Headphones
The Ghetto Blaster Method: Speaker
Experiment 1: Generating Sounds
What You'll Need
Construction
Code
Things to Try
How It Works: Frequency and Sound
Experiment 2: It Speaks!
What You'll Need
Construction
Code
Project: Musical Doorbell
What You'll Need
Construction
Code
Things to Try
Project: Shout-O-Meter54
What You'll Need
Construction
Code
How It Works: Microphone Output
Summary
3
LUMINOUS LIGHT 6
Experiment 3: Sensing Light
What You'll Need
Construction
Code
How It Works
Project: Automatic Night-Light
What You'll Need
Construction
Code
Project: Light Guitar
What Vou'll Nood

73
7 3
75
81
83
84
35
86
86
87
89
92
92
93
93
94
97
98
99
99
00
01
02
03
04
5
06
06
07
07
09
09
12
12
12
14
14

Project: Toothbrushing Monitor	
What You'll Need	117
Construction	117
Code	118
Things to Try	121
Experiment 7: Logging Acceleration to a File	
What You'll Need	
Construction	122
Code	125
Things to Try	
Project: Acceleration Display	127
What You'll Need	128
Construction	128
Code	129
Summary	130
6	
MAD MOVEMENT	131
Experiment 8: Making a Servomotor Move	
What You'll Need	
Construction	
Code	
How It Works: Servomotors and Pulses	
Project: Animatronic Head (Mike the Micro:bit Robot)	
What You'll Need	
Construction	
Code	
Things to Try	
Project: Robot Rover	
What You'll Need	
Construction	
How It Works: Motors and the Flow of Electricity	
Summary	164
7	
TIME TRAVEL	165
Experiment 9: Keeping Time	166
What You'll Need	
Construction	
Code	
How It Works: Keeping Time	
TIOM IT MOTES Treehing Time	103

Project: Binary Clock	169
How to Read the Binary Clock	171
What You'll Need	
Construction	
Code	
How It Works: Telling the Time in Binary	
Project: Talking Clock	
What You'll Need	
Construction	
Code	
How It Works: Teaching the Micro:bit to Speak	
Summary	182
8	
MAD SCIENTIST MIND GAMES	183
Experiment 10: How Fast Are Your Nerves?	184
What You'll Need	185
Construction	185
Testing Your Nervous System	
Code	188
Things to Try	
How It Works: Measuring Your Reaction Time	
Project: Lie Detector	
What You'll Need	
Construction	
Code	195
How It Works: Detecting Lies Through	
Sweat, Voltage, and Resistance	
Summary	198
9	
ENVIRONMENTAL MADNESS	199
Experiment 11: Measuring Temperature	200
What You'll Need	
Construction	201
Code	202
How It Works: Why Does a Processor Heat Up?	203
Project: Temperature and Light Logger	204
What You'll Need	205
Construction	206
Code	
How It Works: Sensors	210

Project: Automatic Plant Waterer	212
What You'll Need	213
Construction	
Code	
Things to Try	
How It Works: Measuring Soil Dampness	
Summary	
10	
RADIO ACTIVITY	225
Experiment 12: Finding the Radio Range	226
What You'll Need	
Construction	227
Code	
How It Works: Radio Signals	
Project: Wireless Doorbell	
What You'll Need	
Construction	233
Code	233
Things to Try	235
How It Works: Sending and Receiving	
Project: Micro:bit-Controlled Rover	236
What You'll Need	236
Construction	237
Code	238
Things to Try	241
How It Works: Motor Driver Blocks	
Summary	243
APPENDIX: GET THE PARTS	245
Useful Tools	246
Common Parts.	
Powering Your Micro:bit.	
Micro:bit Accessories.	
Miscellaneous	