

Table of Contents

- Chapter 1 Introduction p. 1
- Hacking Mindstorms p. 2
- Parts List p. 8
- Building the Plotter Bot p. 9
- Chapter Topics p. 6
- Chapter 2 Project: Plotter Bot p. 7
- Program the Plotter Bot p. 43
- A Simple Program p. 45
- Resetting the X Axis p. 47
- Hacking Opportunities p. 49
- Chapter 3 Hacking LEGO I: Connections p. 51
- Moving the Motors p. 44
- Summary p. 49
- Mindstorms Wires Explained p. 51
- Inside the Mindstorms Wire p. 52
- Hacking Mindstorms Wires p. 53
- Exploring Wireless Options p. 56
- Infrared Sensor and Beacon p. 56
- Bluetooth p. 57
- Hacking Wireless p. 58
- Summary p. 62
- Chapter 4 Project: Remote-Controlled Crane p. 63
- Parts List p. 64
- Building the Crane p. 65
- Programming the Crane p. 93
- Controlling the Crane with Infrared p. 98
- Using Your Phone's Commander App p. 98
- Summary p. 104
- Microcontrollers and Microcomputers p. 106
- Raspberry Pi p. 108
- BeagleBone Black p. 110
- But Why? p. 112
- Example Projects p. 114
- Book Reader p. 114
- Mini Tank p. 115
- Chocolate Milk Maker p. 116
- Ball Counting Robot p. 117
- Rolling Alarm Robot p. 118
- BeagleBone Black Robot p. 119
- Programing Environments p. 120
- Lejos p. 121
- Monobrick p. 121
- Ev3dev p. 121
- Summary p. 122

- Chapter 5 Hacking LEGO II: Alternate Controllers p. 105
- Arduino p. 106
- RobotC p. 121
- Chapter 6 Project: Robot Flower p. 123
- Robot Flower Mindstorms Build p. 124
- Parts List p. 124
- Program the Robot Flower p. 146
- Substituting the Arduino p. 150
- Quick and Dirty Arduino p. 151
- Parts p. 152
- Steps p. 153
- Programming the Arduino p. 154
- Chapter 7 Hacking LEGO III: Create Your Own LEGO Parts p. 157
- Check Your Dimensions p. 159
- Create the Design File p. 160
- Output and Iterate p. 161
- Finding Designs p. 161
- Thingiverse p. 162
- LDraw p. 163
- SketchUp Warehouse p. 163
- Outputting Your Own Parts p. 164
- CNCMill p. 164
- Laser Cutter p. 167
- Steps p. 125
- Summary p. 155
- Designing Your Own Parts p. 158
- 3D Printer p. 170
- Tip: Parametric 3D Models p. 175
- Summary p. 176
- Chapter 8 Project: Ball Contraption p. 177
- Building the Contraption p. 178
- Parts List p. 178
- Steps p. 179
- Program the Contraption p. 224
- Creating Your Own Parts p. 225
- The Baseplate p. 226
- The Gear p. 233
- Summary p. 237
- Chapter 9 Hacking LEGO IV: Add-on Electronics p. 239
- Motors and Wheels p. 240
- Motor Driver p. 240
- Omni-Wheels p. 240
- 8-Channel Servo Controller p. 241
- Hub-ee Wheels p. 242
- Linear Actuator p. 242
- Servo-Actuated Pneumatic Valve p. 243

- Lighting Systems p. 244
- RGB LED Modules p. 244
- Light Strands p. 245
- Sensors p. 246
- Grove Sensor Adapter p. 246
- dGPS p. 246
- Proximity Sensor p. 247
- Pixy and Pixy Adapter p. 248
- Sensor Mux p. 249
- Absolute IMU-ACG p. 250
- dPressure Sensor p. 251
- Thermal Infrared Sensor p. 252
- NXT and Education Electronics p. 252
- Pneumatics Add-On Set p. 252
- NXT Light Sensor p. 253
- NXT Temperature Sensor p. 253
- NXT Sound Sensor p. 254
- NXT Ultrasonic p. 255
- Control Systems p. 255
- Relay Driver p. 256
- sBrick Control System p. 256
- PlayStation Controller interface p. 257
- NXTBee Wireless Board p. 258
- Summary p. 258
- Chapter 10 Project: Flagpole Climber p. 259
- Building the Flagpole Climber p. 260
- Parts List p. 260
- Building Steps p. 262
- Programming the Pole Climber p. 288
- Installing the Ultrasonic Sensor p. 289
- Programming the Sensor p. 290
- Swapping in the BrickPi p. 291
- Raspberry Pi Quick Start p. 292
- Adding the RPi and BrickPi p. 292
- Parts List p. 294
- Steps p. 294
- Tip: Troubleshooting p. 301
- Summary p. 302
- Glossary p. 303
- Index p. 307