

---

# BBC micro:bit

35 Touch Develop &  
microPython Projects



**Dogan Ibrahim**



an Elektor Publication

LEARN | DESIGN | SHARE

---

<b>PREFACE</b> .....	<b>5</b>
<b>Chapter 1 • Microcontrollers</b> .....	<b>11</b>
1.1 What is a microcontroller? .....	11
1.2 Where do we find microcontrollers? .....	11
1.3 How does a microcontroller work? .....	11
1.4 What is a computer program? .....	14
1.5 What is an algorithm? .....	15
<b>Chapter 2 • Touch Develop Programming</b> .....	<b>28</b>
2.1 Creating Touch Develop programs .....	28
2.2 Touch Develop commands .....	30
<b>Chapter 3 • The BBC micro:bit computer</b> .....	<b>37</b>
3.2 LEDs .....	38
3.3 Buttons .....	40
3.4 Compass .....	40
3.5 Accelerometer .....	40
3.6 Large pins .....	40
3.7 Micro USB socket and batteries .....	40
3.8 Hardware development tools .....	40
3.9 What is in the box ? .....	45
<b>Chapter 4 • MicroPython Programming</b> .....	<b>46</b>
4.1 Variable names .....	46
4.2 Comments .....	46
4.3 Indentation .....	46
4.4 String variables .....	47
4.5 List variables .....	47
4.6 Arithmetic operators .....	47
4.7 Comparison operators .....	48
4.8 Logical operators .....	48
4.9 Assignment operators .....	48
4.10 Control of flow .....	48
4.11 Trigonometric functions .....	49

4.12 Mathematical functions . . . . .	50
4.13 String functions . . . . .	50
4.14 Creating a microPython program on the BBC micro:bit . . . . .	50
4.14.1 microPython commands . . . . .	52
<b>Chapter 5 • BBC micro:bit Projects . . . . .</b>	<b>57</b>
Project 1 - Turn on BBC micro:bit LEDs . . . . .	57
Project 2 - Flash a BBC micro:bit LED . . . . .	64
Project 3 - Counting numbers on the LED matrix . . . . .	66
Project 4 - LED animation using the BBC micro:bit LEDs . . . . .	68
Project 5 - Button input . . . . .	70
Project 6 - Button following LEDs . . . . .	71
Project 7 - Flash an external LED . . . . .	74
Project 8 - Lighthouse LED . . . . .	77
Project 9 - Flash an LED with happy face . . . . .	79
Project 10 - Chasing LEDs . . . . .	81
Project 11 - External button input . . . . .	84
Project 12 - Reaction timer with button . . . . .	87
Project 13 - Digital thermometer . . . . .	90
Project 14 - Digital thermostat . . . . .	93
Project 15 - Generating musical tones . . . . .	96
Project 16 - Steady hands . . . . .	100
Project 17 - Noise generator . . . . .	102
Project 18 - Simple metronome . . . . .	103
Project 19 - More advanced metronome . . . . .	104
Project 20 - Measuring the light level . . . . .	106
Project 21 - Darkness reminder . . . . .	109
Project 22 - RGB LED . . . . .	112
Project 23 - Randomly changing LED colours . . . . .	115
Project 24 - Quiz game controller . . . . .	116
Project 25 - DC motor control . . . . .	119
Project 26 - Changing the speed of the motor . . . . .	122

Project 27 - Spirit level with buzzer . . . . .	123
Project 28 - Serial Communication . . . . .	125
Project 29 - Send the temperature to a PC . . . . .	129
Project 30 - Display temperature on the PC . . . . .	132
Project 31 - Times table. . . . .	134
Project 32 - What direction are we heading to?. . . . .	136
Project 33 - Calculator using the PC . . . . .	137
Project 34 - Protect yourself from the ultraviolet rays . . . . .	141
Project 35 - Servo Control . . . . .	145
<b>Chapter 6 • Saving your program and working with a mobile device . . . . .</b>	<b>149</b>
6.1 Saving and recalling a program . . . . .	149
6.2 Accessing BBC micro:bit using a mobile device . . . . .	149
6.2.1 Accessing using an Android phone . . . . .	149
<b>Appendix • Converting from Block Editor to Touch Develop . . . . .</b>	<b>153</b>