

---

# Home Automation Projects with Arduino

## Using the RFID Starter kit

All components required for these experiments are  
contained in the RFID Starter kit



**Günter Spinner**



an Elektor Publication

LEARN | DESIGN | SHARE

---

<b>Introduction</b> . . . . .	<b>9</b>
<b>Chapter 1 • A quick introduction to the Hard- and Software</b> . . . . .	<b>11</b>
1.1 The first Functional Test . . . . .	14
1.2 Programming the Arduino. . . . .	16
1.3 Resistors: A Basic Element of Electronics . . . . .	19
1.4 Are you well connected? Jumper cables . . . . .	20
1.5 LEDs . . . . .	21
1.6 Battery power for the Arduino. . . . .	22
<b>Chapter 2 • Fire up the Arduino - Projects for beginners</b> . . . . .	<b>23</b>
2.1 Alarm system simulator . . . . .	23
2.2 SOS Emergency signal . . . . .	23
2.3 Mood lighting with a multicolor LED . . . . .	24
2.4 Switches that Bounce. . . . .	26
2.5 Data input using a keypad . . . . .	30
2.6 Warning signals of every pitch. . . . .	34
2.7 Too few port pins? You need a shift register . . . . .	37
2.8 Binary counter . . . . .	38
2.9 Model airfield runway lights . . . . .	40
2.10 Serial Data Output. . . . .	40
2.11 Voltage measurement on a row of LEDs . . . . .	42
<b>Chapter 3 • Display Technology</b> . . . . .	<b>46</b>
3.1 An LCD for the Arduino. . . . .	46
3.2 Attention! Warning Signal Display . . . . .	49
3.3 Driving Seven-Segment Displays . . . . .	50
3.4 Pin-saving Shift Register. . . . .	55
3.5 Universally useful: The 4x7 segment Display Module . . . . .	57
3.6 A Counter... Not just for beans. . . . .	59
3.7 The SevenSeg Library . . . . .	63
3.8 A Digital Clock. . . . .	64
3.9 For Numbers, Characters and Icons: 8x8 Dot Matrix Display . . . . .	64
3.10 The Running Light Spot . . . . .	67

3.11 Beaming Smileys and Glowing Icons . . . . .	68
3.12 Mini Display using an LED Matrix . . . . .	71
3.13 A Joystick-controlled light point . . . . .	74
<b>Chapter 4 • Measuring the Environment . . . . .</b>	<b>77</b>
4.1 Dry Out the Cellar: Hygrometer Monitors Humidity. . . . .	77
4.2 Weather Station with LC Display . . . . .	80
4.3 Workplace Bright Enough? A Digital Lux Meter. . . . .	82
<b>Chapter 5 • Sensor Technology . . . . .</b>	<b>86</b>
5.1 The Flame Detector . . . . .	87
5.2 Alarm system with tilt switch . . . . .	90
5.3 Precise Temperature Measurement with the LM35 Sensor. . . . .	92
5.4 Measuring low Temperatures. . . . .	94
5.5 Shout or whisper - measure the level with a sound sensor . . . . .	95
5.6 Remote Control without a Transmitter: The intelligent Clap Switch . . . . .	98
5.7 Rain or shine? A water level sensor can alert you . . . . .	100
5.8 Umbrella alert! – A rainfall alarm. . . . .	102
<b>Chapter 6 • Motors and Servos control the world . . . . .</b>	<b>104</b>
6.1 The Stepper Motor and Motor Driver Module. . . . .	105
6.2 From rotation to single steps. . . . .	107
6.3 Turntable to display Jewelry or scale models. . . . .	109
6.4 Use the Joystick for Motor Control . . . . .	109
6.5 The Servo as a Universal Actuator . . . . .	110
6.6 Controlled Motor Power: The Servo . . . . .	110
6.7 The Servo Library . . . . .	113
6.8 Precise Servo Control. . . . .	113
<b>Chapter 7 • Banish the Spaghetti: Control Wirelessly . . . . .</b>	<b>116</b>
7.1 For Convenience: Remote Control with an IR Receiver . . . . .	116
7.2 A Remotely Contolled LED . . . . .	119
7.3 Wireless Data Reading: The RFID module. . . . .	120
7.4 Contactless door entry control. . . . .	124
7.5 RFID Tags Store Data . . . . .	126

---

<b>Chapter 8 • Experimental projects for Advanced Users</b> . . . . .	<b>129</b>
8.1 Always the Right Time: The RTC Module. . . . .	129
8.2 Digital clocks and timers for precise time measurements . . . . .	134
8.3 Conway’s Game of Life. . . . .	137
8.4 Hello Matrix! . . . . .	140
8.5 Live Ticker and Running Text . . . . .	143
8.6 Switching High Power Loads: The Relay Module. . . . .	146
8.7 Remote controlled Halogen Lamp . . . . .	147
8.8 Keypad Door Entry System . . . . .	148
<b>Chapter 9 • Principles of Arduino Programming</b> . . . . .	<b>152</b>
<b>Chapter 10 • Use of Libraries.</b> . . . . .	<b>160</b>
<b>Chapter 11 • Fault finding</b> . . . . .	<b>162</b>
<b>Chapter 12 • Components and Modules.</b> . . . . .	<b>163</b>
<b>Chapter 14 • Literature</b> . . . . .	<b>184</b>
<b>Chapter 15 • Illustration Listing</b> . . . . .	<b>185</b>
<b>Index</b> . . . . .	<b>188</b>