Funduino

Funduino Cube

Soldering instructions

ALTER:
10+

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Mathematik | Informatik | Naturwissenschaften | Technik

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Preface

Hello!

By purchasing the Funduino Cube soldering exercise, you have already taken the first step towards becoming a real soldering pro!

Soldering is an important skill that you need in the field of electronics and technology. It allows you to connect electronic components together in a permanent and electrically conductive way. If you can solder, you will be able to implement your own electronics projects and reliably rectify faults.

This exercise will help you to use a soldering iron safely. Step by step, you will learn how to successfully assemble the Funduino Cube. All work steps are explained in detail and are easy to understand, so that even beginners can follow along without any problems.

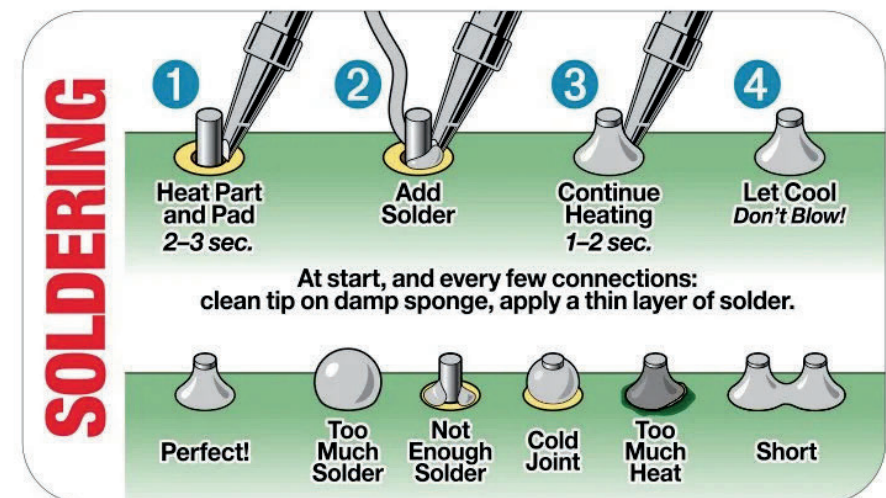**Particularly important when soldering:**

- Safety - Make sure your workplace is well ventilated and handle hot tools with care.
- Temperature of the soldering iron - Set a suitable temperature (approx. 300-350 °C) to avoid damaging the components.
- Cleanliness - Clean the soldering tip regularly, as only a clean tip delivers good results.
- Solder dosage - Use exactly the right amount of solder to achieve clean and stable solder joints.
- Soldering time - Do not heat the components for too long to avoid damage.
- Check - Check each individual solder joint carefully so that you can be sure that it will last.
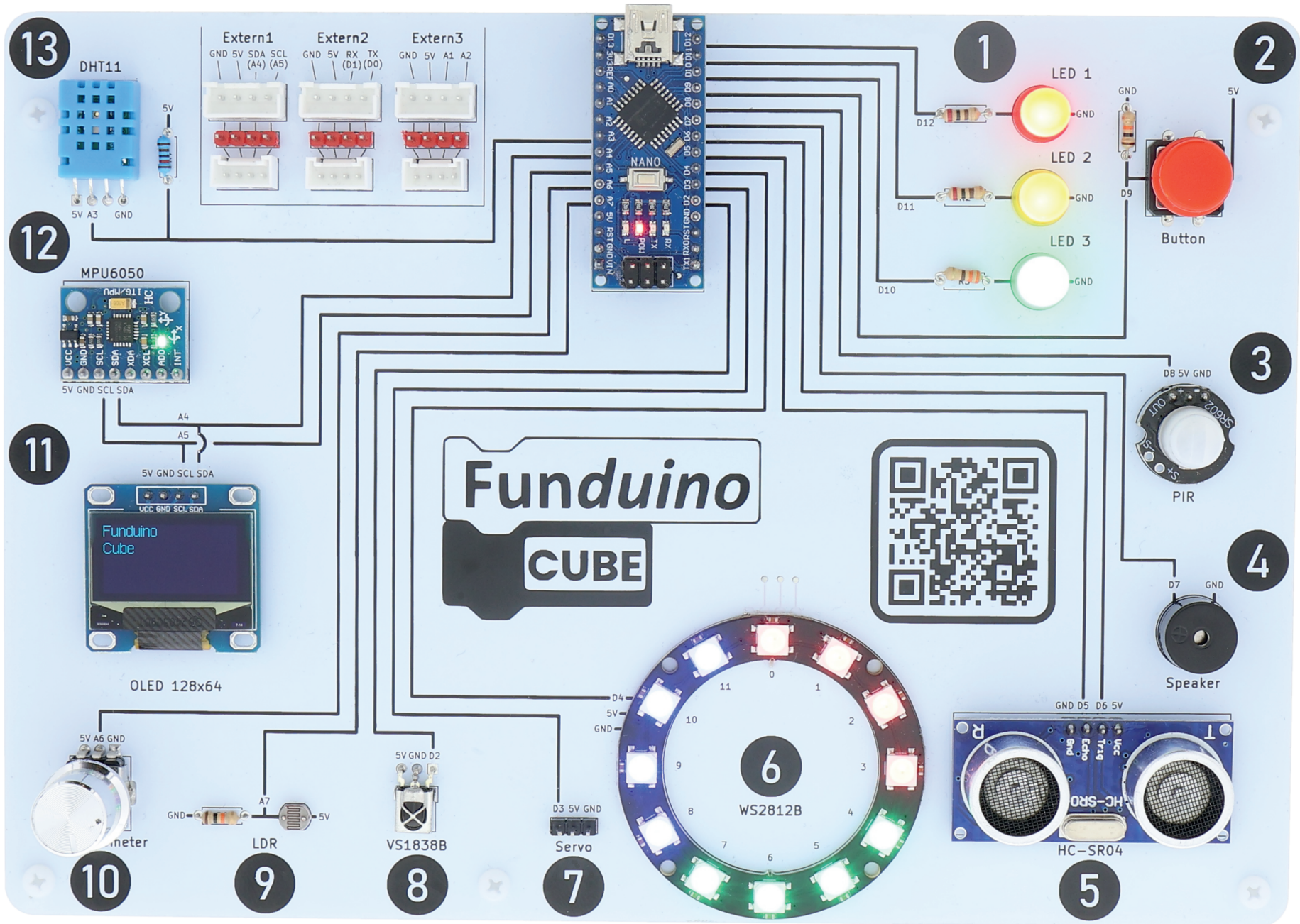
How to recognize a "cold" solder joint

You can recognize a cold solder joint by the following characteristics:
Matte or rough surface - Instead of shiny, the solder joint appears dull and gray.
Irregular shape - The solder joint is not even, but lumpy or deformed.
Cracks or fractures - Small cracks or visible fractures in the solder.
Poor contact - The component wobbles or moves slightly.

If you detect a cold solder joint, you should heat it up again and re-solder with fresh solder to establish a reliable electrical contact.

SOLDERING

1. Heat Part and Pad 2–3 sec.
2. Add Solder
3. Continue Heating 1–2 sec.
4. Let Cool Don't Blow!

At start, and every few connections: clean tip on damp sponge, apply a thin layer of solder.

Perfect! | Too Much Solder | Not Enough Solder | Cold Joint | Too Much Heat | Short

Reference: The *finished* Funduino Cube

Reference: The unassembled circuit board of the Funduino Cube

0 **Slot for the Nano R3 microcontroller**
   1. First insert one of the two socket strips into the soldering point provided.
   2. Place a soldering point on the back of the circuit board to prevent the socket strip from slipping out.
   3. Repeat the first two steps for the second socket strip.
   4. Solder all solder joints on both socket strips.

1 **Light-emitting diodes (LED 1, LED 2, LED 3)**
Note: Make sure to place the series resistors close to the circuit board

Part 1: Series resistors
   1. Insert the series resistors into the slots provided
   - R1: 200 Ohm (color code: red, black, brown, gold)
   - R2: 200 Ohm (color code: red, black, brown, gold)
   - R3: 330 Ohm (color code: orange, orange, brown, gold)
   2. Solder all solder joints of the series resistors.

Part 2: Light emitting diodes
Note: Pay attention to the polarity of the LED (flat and round side of the component)

   1. Place the red LED on the circuit board.
   2. Solder all solder joints of the red LED.
   3. Place the yellow LED on the circuit board.
   4. Solder all solder joints of the yellow LED.
   5. Place the green LED on the circuit board.
   6. Solder all solder joints of the green LED.

2 **Button**
   1. Place the button on the circuit board.
   2. Solder all solder joints of the button.

3 **PIR**
   1. Place the motion detector on the circuit board.
   2. Solder all the solder joints of the motion detector.

4 **Speaker**
Note: Pay attention to the polarity of the loudspeaker. You will find a "+" sign on the top of the module. Align the speaker so that the "+" sign is facing "D7".

   1. Place the motion detector on the circuit board.
   2. Solder all the solder joints of the motion detector on the back.

5 **Ultrasonic sensor (HC-SR04)**
   1. Place the ultrasonic sensor on the circuit board.
   2. Solder all the solder joints of the ultrasonic sensor.

6 **WS2812 LED ring**

Note: Soldering the WS2812 LED ring is comparatively demanding. You should postpone this task to the end if you are not yet confident in soldering.

1. Apply a little solder to the solder pads on the circuit board of the cube.
2. Moisten the solder pads of the LED ring with a little solder.
3. Place the LED ring on the circuit board of the cube.
4. Align the LED ring so that the wetted solder pads are on top of each other.
5. Heat the solder pads on the Funduino Cube until the solder liquefies.
6. Carefully press on the LED ring.
7. Hold the soldering iron to the gap between the board and the WS2812 ring so that the solder pads of both modules become liquid.

7 **Servo motor**

1. Insert the short side of the pin header with three contacts into the soldering points provided.
2. Solder all the solder joints on the pin header.

8 **Infrared receiver (VS1838B)**

1. Insert the pins of the receiver into the soldering points provided.
2. Make sure that the VS1838B module is facing away from you after insertion (silver side facing the outer edge of the board).
3. Carefully bend the receiver towards the board.
4. Once you have aligned the module so that the corresponding outline on the board is covered, solder all the solder joints of the receiver.

9 **LDR**

Note: Make sure to place the resistors close to the circuit board

Part 1: Series resistor
1. Insert the series resistor into the designated solder joints R6: 10K Ohm (color code: brown, black, orange, gold)
2. Solder all solder joints of the series resistor.

Part 2: Photoresistor
1. Insert the series resistor into the slot provided.
2. Solder all the solder joints of the photoresistor.

10 **Potentiometer**

1. Insert the potentiometer into the soldering points provided.
2. Solder all solder joints of the potentiometer.
3. Place the cap of the potentiometer on the component.

11 **OLED (128 x 64)**

1. Insert the OLED into the soldering points provided.
2. Solder all solder joints of the OLED.

12 **Gyroscope, position and acceleration sensor (MPU-6050)**
   1. Insert the MPU-6050 module into the soldering points provided.
   2. Solder all solder joints of the MPU-6050.

13 **Temperature and humidity sensor (DHT11)**
Note: Make sure to place the resistors close to the circuit board

Part 1: Series resistor
   1. Insert the series resistor into the designated soldering points R7: 1.2K Ohm (color code: brown, red, black, brown, brown)
   2. Solder all solder joints of the series resistor.

Part 2: DHT11
   1. Insert the DHT11 sensor into the slot provided.
   2. Make sure that the sensor points in your direction after insertion (side without perforation points to the outer edge of the Cube board, please compare with "Reference: The finished Funduino Cube").
   3. Carefully bend the DHT11 sensor towards the board.
   4. Once you have aligned the module so that the corresponding outline on the board is covered, solder all the solder joints of the sensor.
   5. Tip: Attach the DHT11 to the circuit board with some double-sided adhesive tape.

14 **External 1, External 2, External 3**

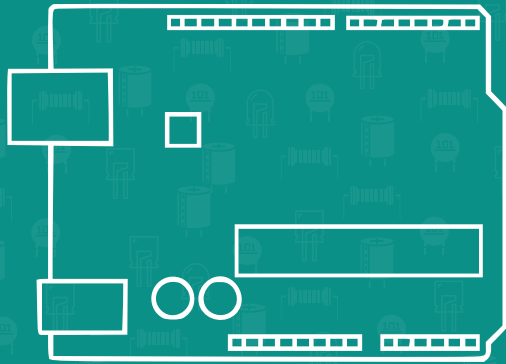### Part 1: Notes on positioning
   1. If you look at the three outline drawings on the circuit board of the Funduino Cube, the socket connectors and the pin header must be positioned as follows
   - Top: XH2.54 socket strip
   - Middle: Pin header with four contacts
   - Bottom: Grove socket strip
   2. On both socket strips, the sides on which the locking aids for the plug-in cables ("holes") are located must each face the outer edge of the board.
   3. Insert the short side of the pin header with four contacts into the soldering points provided.

Part 2: Soldering
   1. *Start soldering the XH2.54 female connector to external 1.*
   2. *Place the socket strip on the circuit board.*
   3. *Solder all solder joints of the socket connector.*
   4. *Repeat steps 1-3 for all other slots of External 1, External 2 and External 3.*

Congratulations!

We hope you enjoy using the Funduino Cube!