These slides serve as a visual aid for the lecture, not as a comprehensive document or script.

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For any comments or feedback, please contact n.meseth@hs-osnabrueck.de.

Programming Challenges

Exercises for the book
Hands-On Computer Science

with the LED

boilerplate code

```
from tinkerforge.ip_connection import IPConnection
from tinkerforge.bricklet_rgb_led_v2 import BrickletRGBLEDV2

ipcon = IPConnection()
ipcon.connect("localhost", 4223)
led = BrickletRGBLEDV2("<YOUR_UID>", ipcon)
led.set_rgb_value(0, 0, 0)
```

challenge #1 - color selection

Ask the user to enter a color name (“red”, “green”, “blue”). The LED should light up in that color. If the input is unknown, the LED should turn white.

challenge #2 - brightness control

Ask the user to enter a number between 0 and 100. The LED should light up with the corresponding brightness.

challenge #3 - on/off control

Continuously ask the user whether the LED should be turned “on” or “off”. The program ends only when the user enters “stop”.

challenge #4 - blinking sequence

Ask the user for a number. The LED should blink exactly that many times and then stay off.

Add-on: Let the user choose the speed of the blinking, too.

challenge #5 - traffic light

Simulate a traffic light by cycling through red, yellow, and green automatically, each color for a short time.

challenge #6 - random color

Every time the user presses Enter, the LED should show a randomly chosen color.

challenge #7 - morse code

The LED blinks the word “SOS” in Morse code using short and long flashes.

with the rotary encoder

challenge #8 - counter

Turning the knob changes a counter value. The program prints the current value regularly in the console.

Add-on: the counter can only move between 0 and 10. If the knob is turned beyond this range, the value stays at the limit.

Add-on: a short press resets the counter to 0. A long press shows a message in the console.

challenge #9 - direction indicator

The program detects whether the knob is turned to the left or to the right and prints the direction.

challenge #10 - rotation speed level 1

The program measures how fast the knob is turned and indicates whether it is slow or fast by printing "slow" or "fast" to the console. No rotation → print "still".

challenge #11 - color menu level 1

Turning the knob scrolls through several color options. Pressing the knob confirms the current selection and prints it to the console.

challenge #12 - speedometer

The program counts how many steps the knob is turned in one second and prints the number continuously. How fast can you go?

with LED AND the
rotary encoder

challenge # - rotation speed level 2

The program measures how fast the knob is turned and indicates whether it is slow or fast by lighting up the LED from green (slow) over orange (medium) to red (fast). No rotation → LED is off.

challenge # - color menu level 2

Turning the knob scrolls through several color options. Pressing the knob confirms the current selection and lights up the LED in the corresponding color.