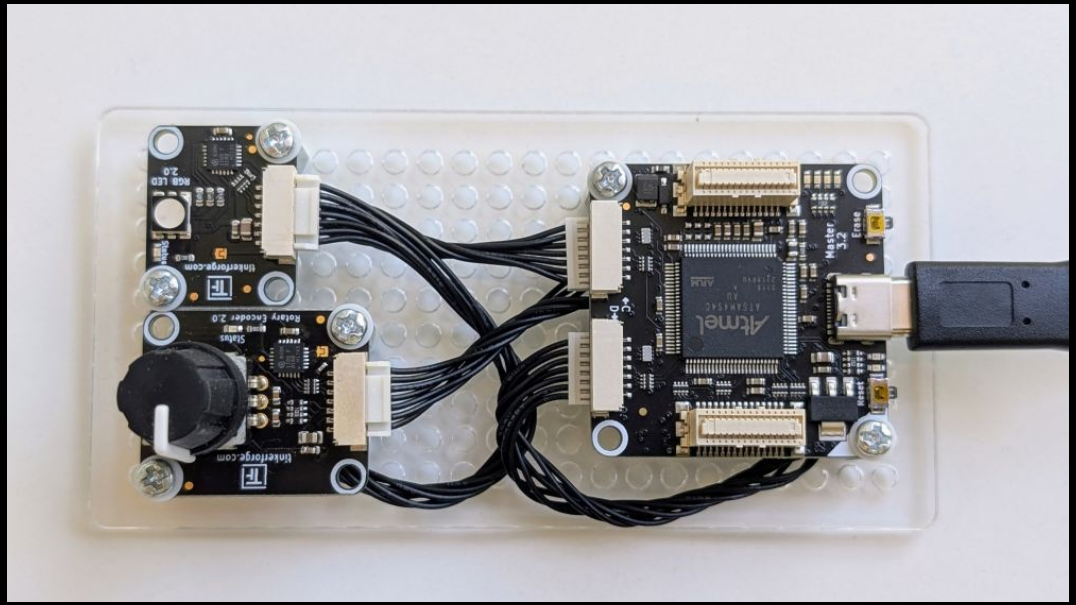
These slides serve as a visual aid for the lecture, not as a comprehensive document or script.

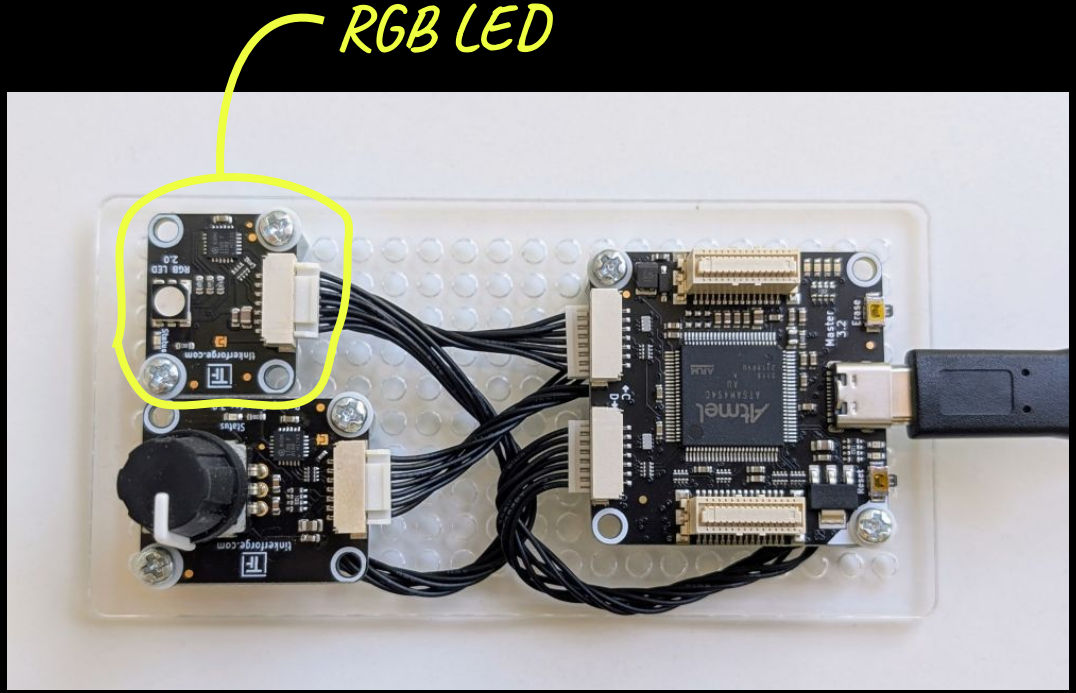
Please refrain from printing these slides to help protect the environment.

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

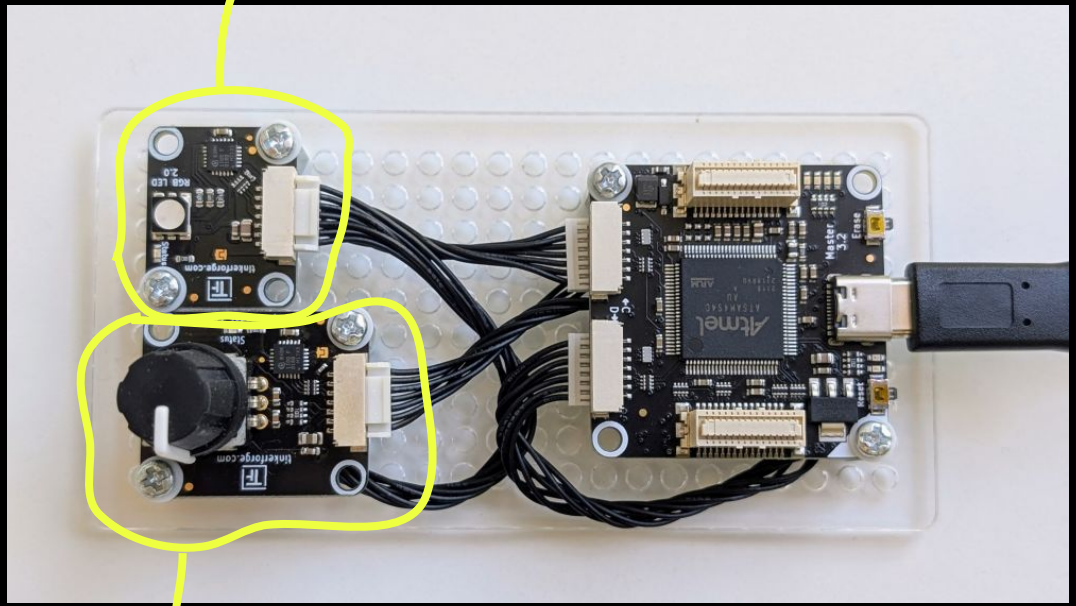
IMAGES

Supporting slides for chapter 4 of the book
Hands-On Computer Science

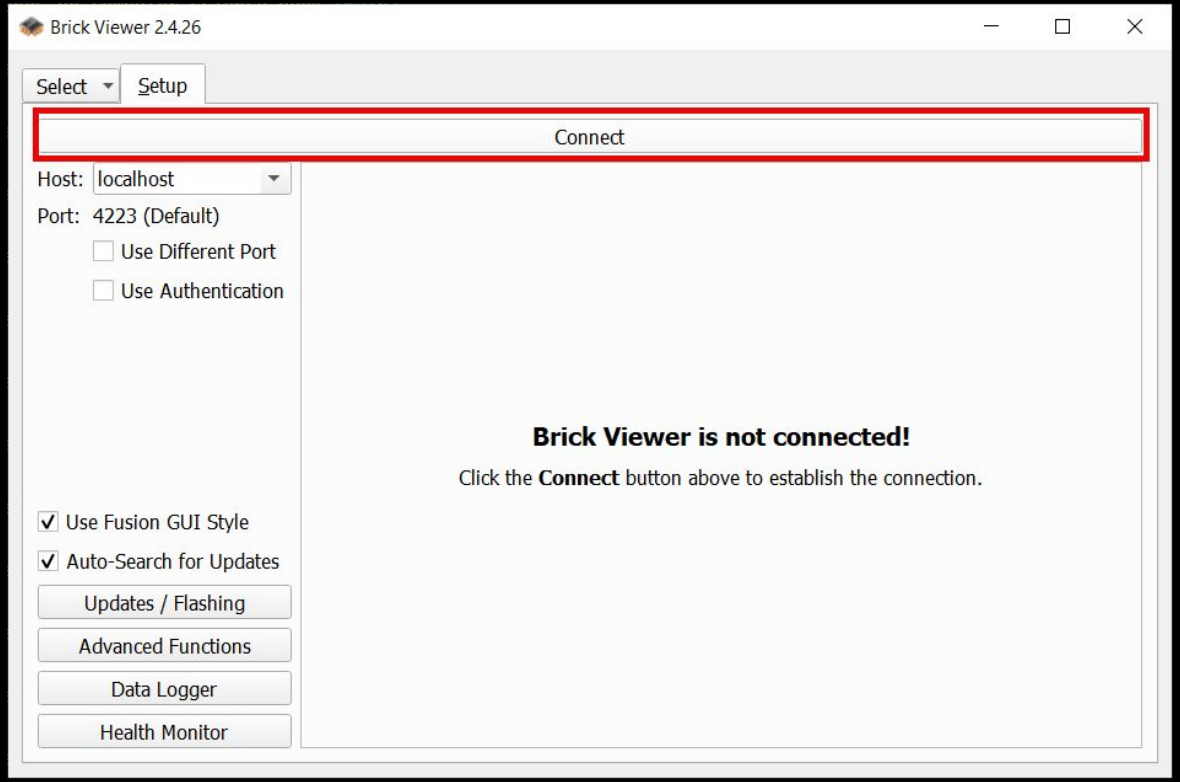

RGB LED 2.0
tinkerforge.com
Rotary Encoder 2.0
Status
tinkerforge.com
Master 3.2
Erase
Atmel

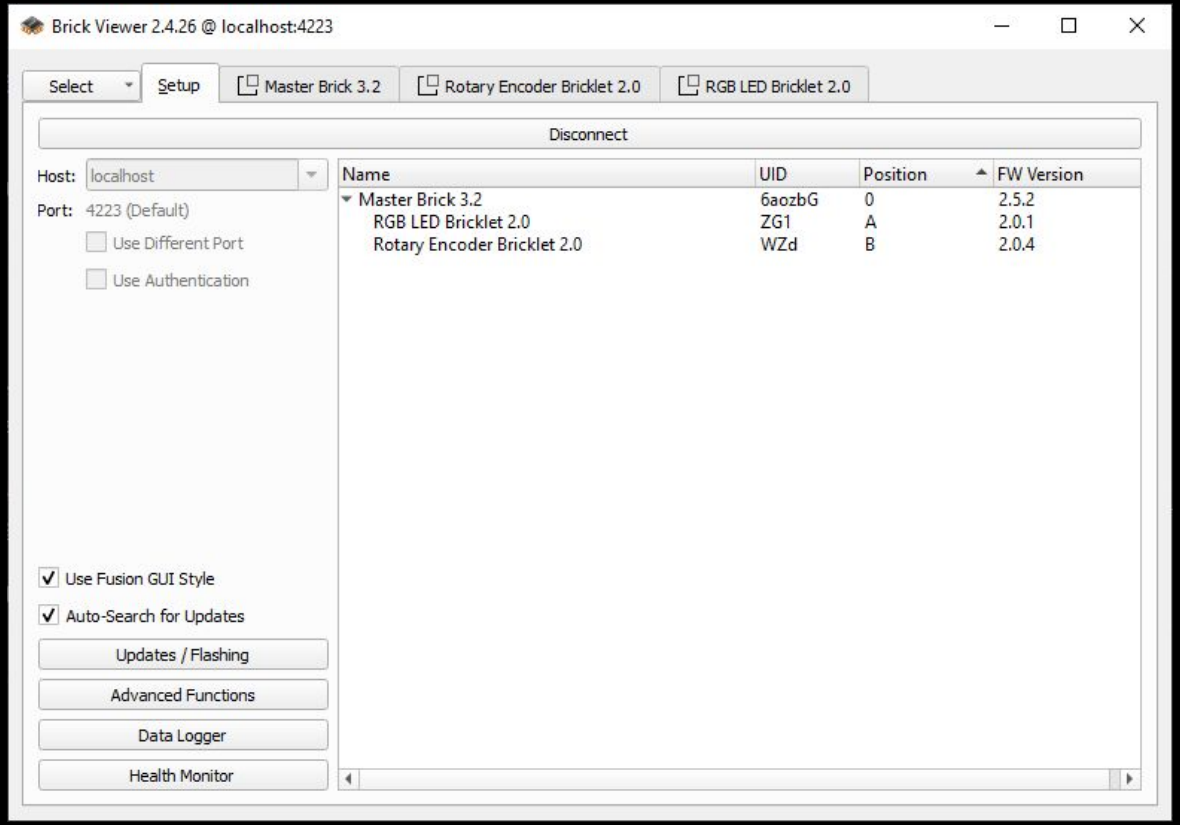

RGB LED

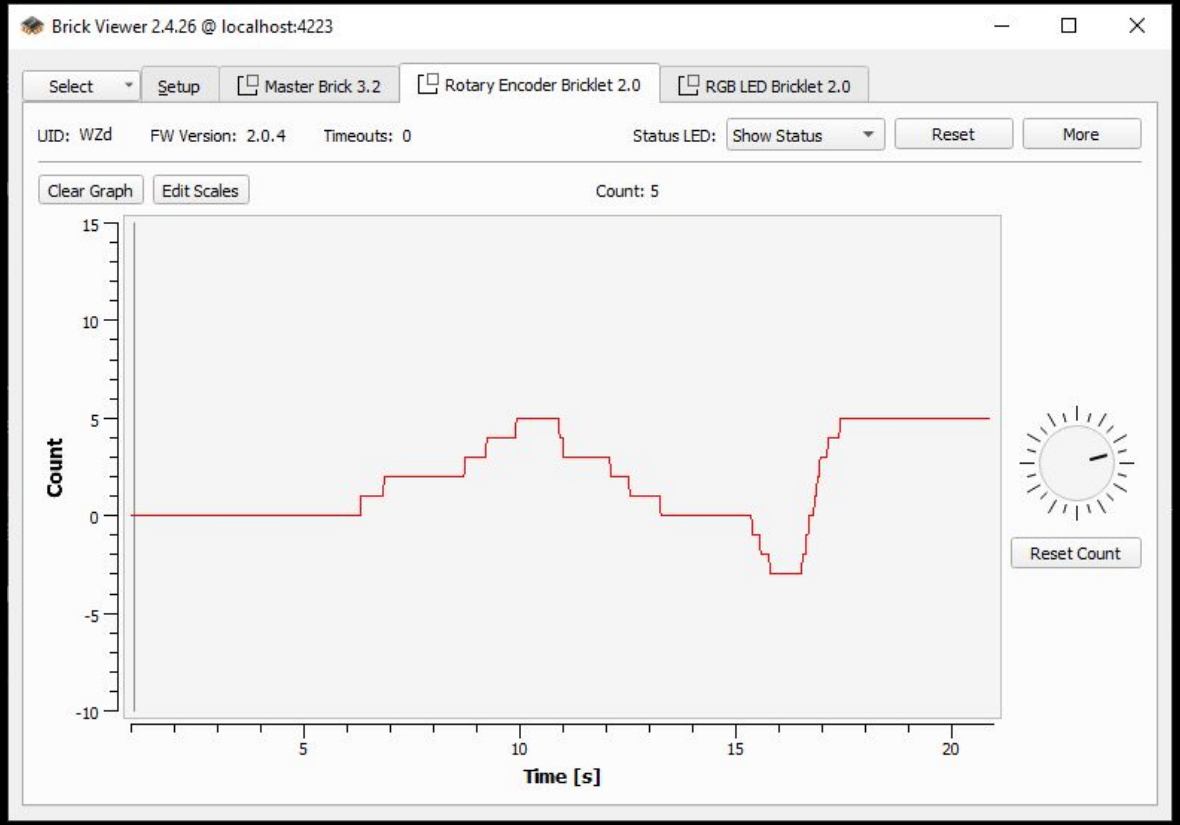
RGB LED



Rotary Encoder


Brick Viewer 2.4.26
Select
Setup
Connect
Host: localhost
Port: 4223 (Default)
Use Different Port
Use Authentication
Brick Viewer is not connected!
Click the Connect button above to establish the connection.
Use Fusion GUI Style
Auto-Search for Updates
Updates / Flashing
Advanced Functions
Data Logger
Health Monitor


Brick Viewer 2.4.26 @ localhost:4223
Select
Setup
Master Brick 3.2
Rotary Encoder Bricklet 2.0
RGB LED Bricklet 2.0
Disconnect
Host:
localhost
Port:
4223 (Default)
Use Different Port
Use Authentication
Name
UID
Position
FW Version
Master Brick 3.2
6aozbG
0
2.5.2
RGB LED Bricklet 2.0
ZG1
A
2.0.1
Rotary Encoder Bricklet 2.0
WZd
B
2.0.4
Use Fusion GUI Style
Auto-Search for Updates
Updates / Flashing
Advanced Functions
Data Logger
Health Monitor


Brick Viewer 2.4.26 @ localhost:4223
Select
Setup
Master Brick 3.2
Rotary Encoder Bricklet 2.0
RGB LED Bricklet 2.0
UID: WZd
FW Version: 2.0.4
Timeouts: 0
Status LED:
Show Status
Reset
More
Clear Graph
Edit Scales
Count: 5
15
10
5
0
-5
-10
Count
5
10
15
20
Time [s]
Reset Count

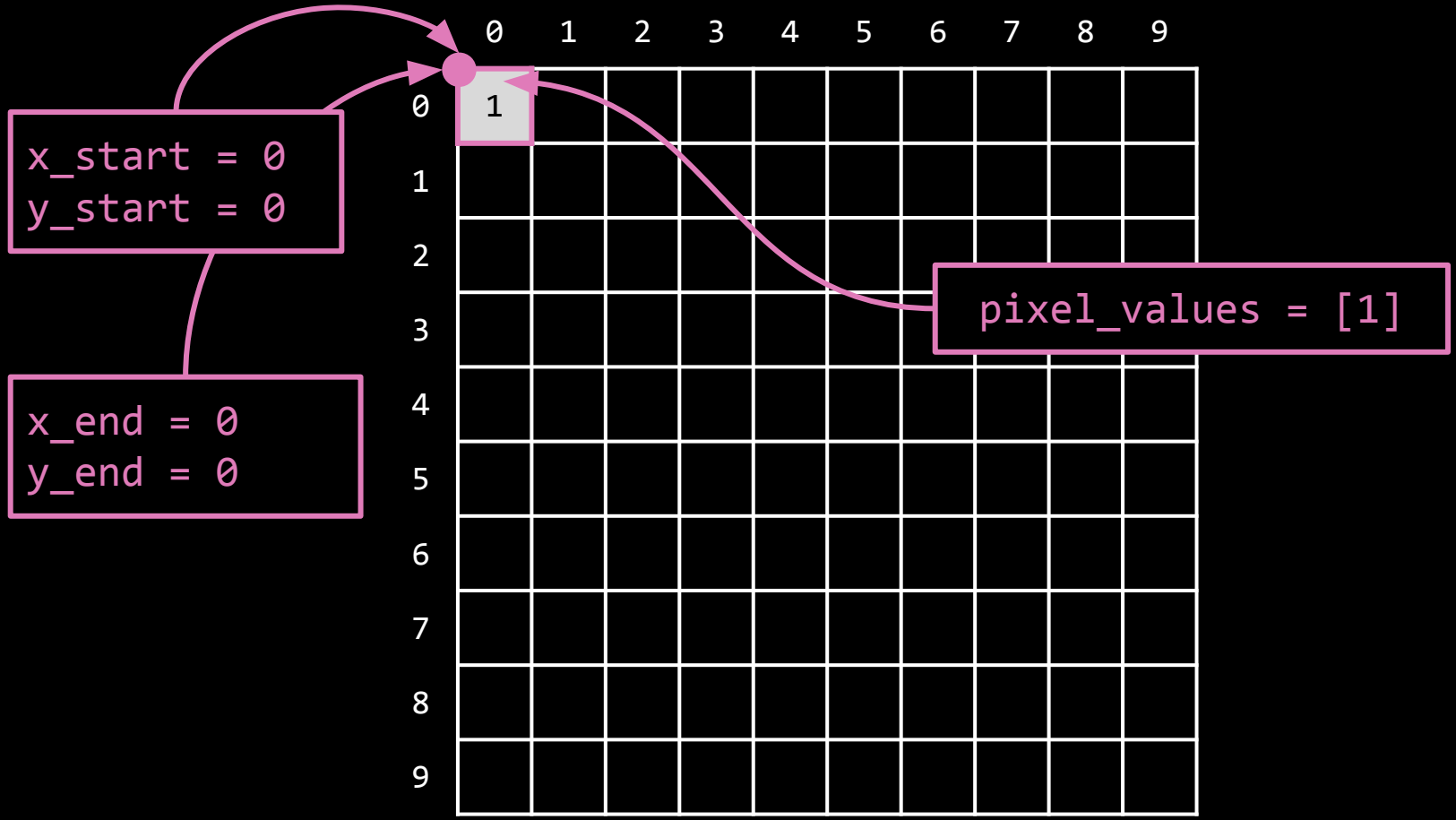
boilerplate code

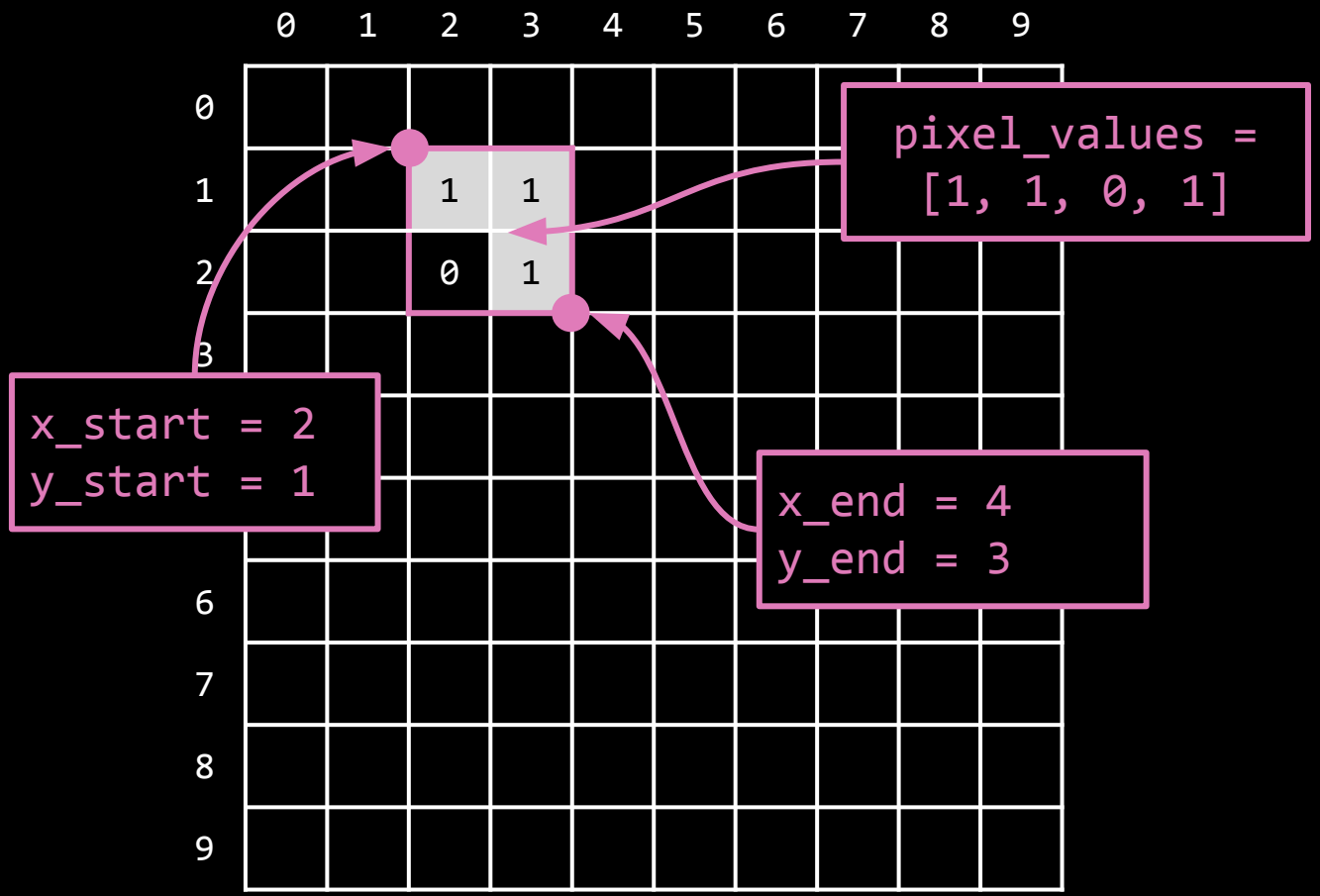
```
from tinkerforge.ip_connection import IPConnection
from tinkerforge.bricklet_rotary_encoder_v2 import BrickletRotaryEncoderV2

ipcon = IPConnection()
ipcon.connect("localhost", 4223)
knob = BrickletRotaryEncoderV2("WZd", ipcon)
```

reading the counter

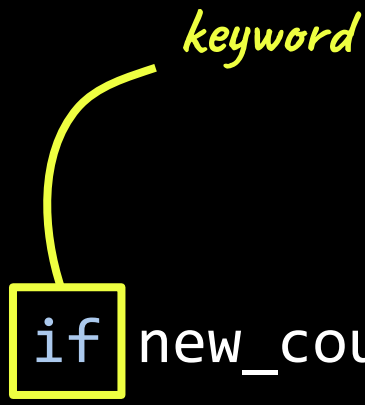
```
from tinkerforge.ip_connection import IPConnection
from tinkerforge.bricklet_rotary_encoder_v2 import BrickletRotaryEncoderV2

ipcon = IPConnection()
ipcon.connect("localhost", 4223)
knob = BrickletRotaryEncoderV2("WZd", ipcon)

count = knob.get_count(reset=False)
```

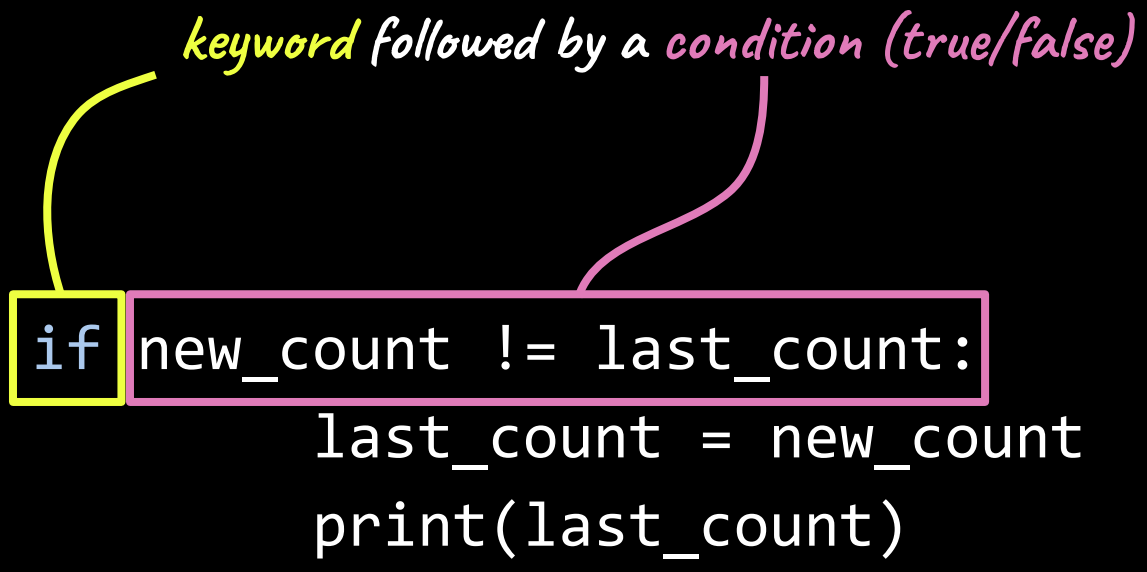
PIXELS

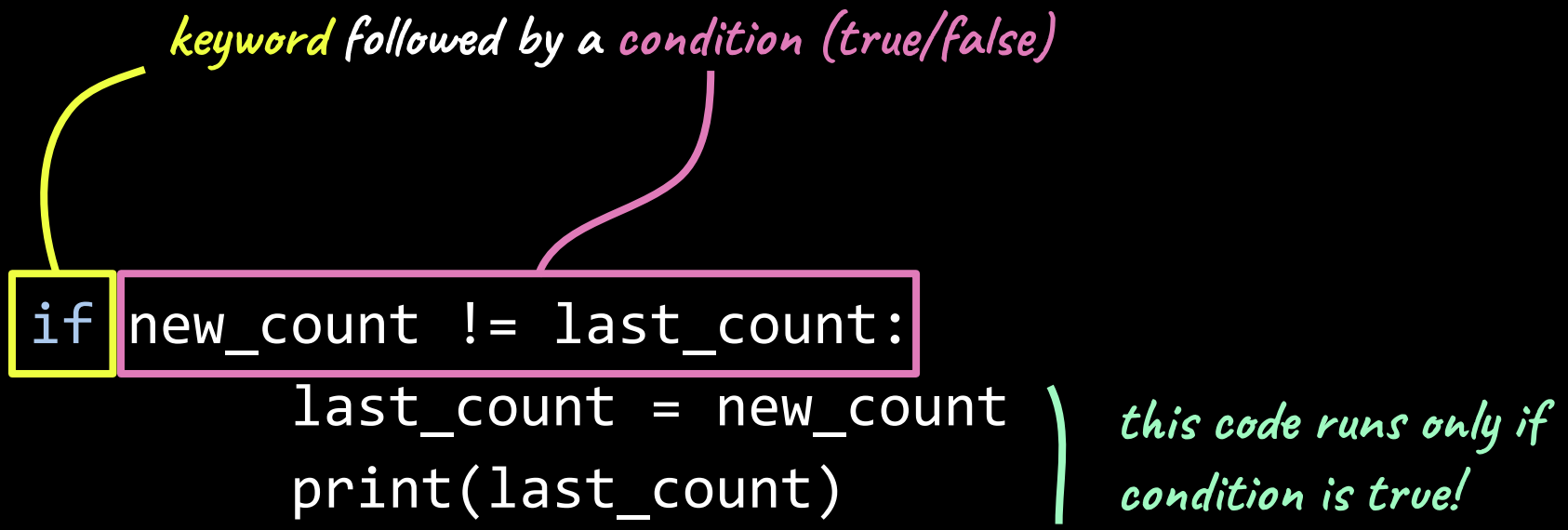

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
1
x_start = 0
y_start = 0
x_end = 0
y_end = 0
pixel_values = [1]


0 1 2 3 4 5 6 7 8 9
0
1
2
3
6
7
8
9
1 1
0 1
pixel_values =
[1, 1, 0, 1]
x_start = 2
y_start = 1
x_end = 4
y_end = 3

CONTROL STRUCTURES


keyword
if new_count != last_count:
last_count = new_count
print(last_count)


keyword followed by a condition (true/false)
if new_count != last_count:
last_count = new_count
print(last_count)


keyword followed by a condition (true/false)
if new_count != last_count:
last_count = new_count
print(last_count)
this code runs only if condition is true!

LED DIMMER V1

```
knob.reset()
last_count = 0

while True:
    new_count = knob.get_count(reset=False)

    if new_count != last_count:
        last_count = new_count
        led.set_rgb_value(last_count, last_count, last_count)
```

```
knob.reset()
last_count = 0

while True:
    new_count = knob.get_count(reset=False)

    if new_count != last_count:
        last_count = new_count
        led.set_rgb_value(last_count, last_count, last_count)
```

```
struct.error: ubyte format requires 0 <= number <= 255
```

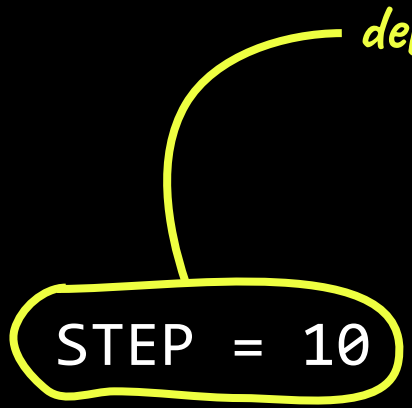
NUMBER SYSTEMS

BITS & BYTES

LED DIMMER V2

```
brightness = 0
...
diff = new_count - last_count
brightness += diff
```

```
brightness = max(0, min(255, brightness))
```




```
STEP = 10
...
brightness += diff * STEP
brightness = max(0, min(255, brightness))
```

READING THE BUTTON

```
while True:
    if knob.is_pressed():
        print("Button pressed")
    else:
        print("Button not pressed")
```

LED DIMMER V3

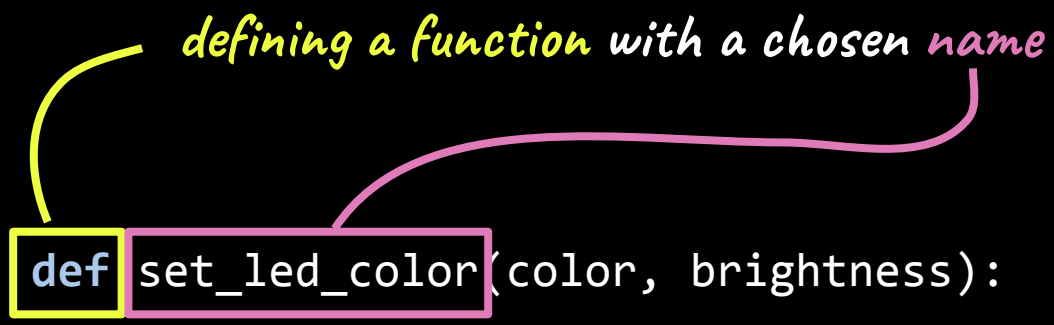
```
if color == "white":
    led.set_rgb_value(brightness, brightness, brightness)
if color == "yellow":
    led.set_rgb_value(brightness, brightness, 0)
if color == "green":
    led.set_rgb_value(0, brightness, 0)
```

```
button_pressed_before = False
while True:
    button_pressed_after = knob.is_pressed()

    if button_pressed_before == True and button_pressed_after == False:
        if color == "white":
            color = "yellow"
        elif color == "yellow":
            color = "green"
        elif color == "green":
            color = "white"

    button_pressed_before = button_pressed_after
```

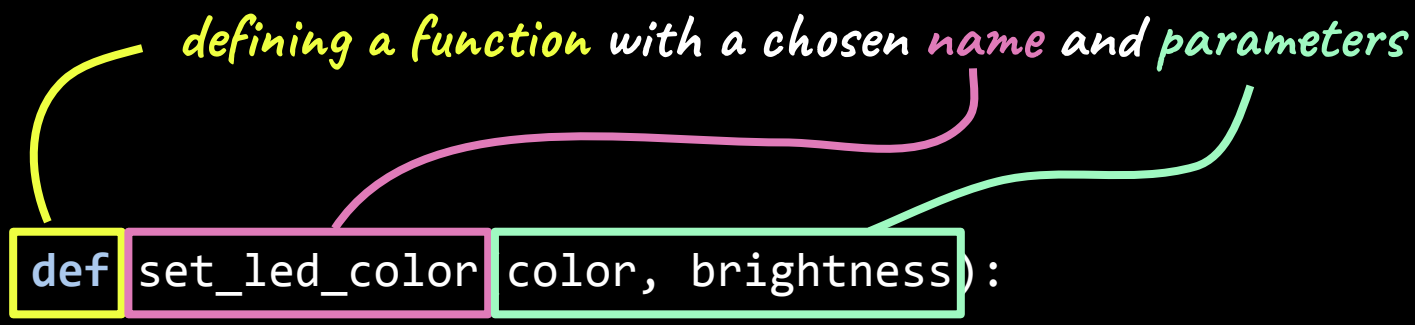
FUNCTIONS

defining a function

```
def set_led_color(color, brightness):
    if color == "white":
        led.set_rgb_value(brightness, brightness, brightness)
    if color == "yellow":
        led.set_rgb_value(brightness, brightness, 0)
    if color == "green":
        led.set_rgb_value(0, brightness, 0)
```




```
def set_led_color(color, brightness):
    if color == "white":
        led.set_rgb_value(brightness, brightness, brightness)
    if color == "yellow":
        led.set_rgb_value(brightness, brightness, 0)
    if color == "green":
        led.set_rgb_value(0, brightness, 0)
```


defining a function with a chosen name and parameters
def set_led_color color, brightness):
if color == "white":
led.set_rgb_value(brightness, brightness, brightness)
if color == "yellow":
led.set_rgb_value(brightness, brightness, 0)
if color == "green":
led.set_rgb_value(0, brightness, 0)