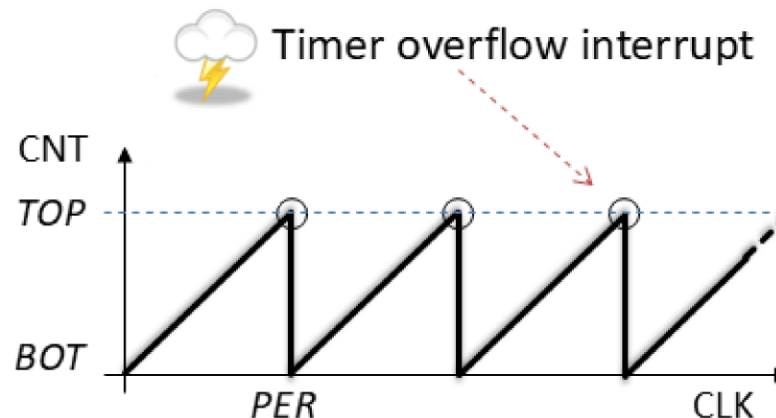# Timers and Interrupts

## Embedded Software

Wolfgang Neff

Assignment 1

- Controlling a LED by a Timer
  - Please let the blue LED of the Color Click blink by means of a timer.
   - As of now the loop function will be empty.

Assignment 2

- Controlling two LEDs by one Timer
    - Please let the LEDs of the Color Click blink by means of a timer as follows:
        - The red LED blinks with a frequency of 0.5 Hz.
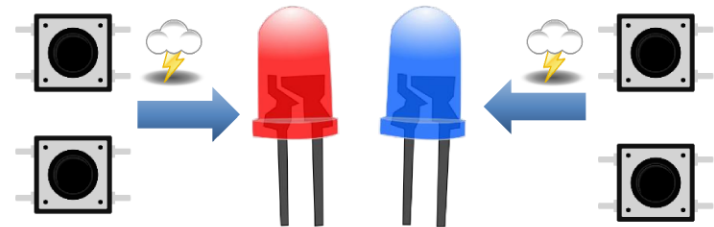   - The blue LED blinks with a frequency von 2 HZ.

0.5 Hz   2 Hz
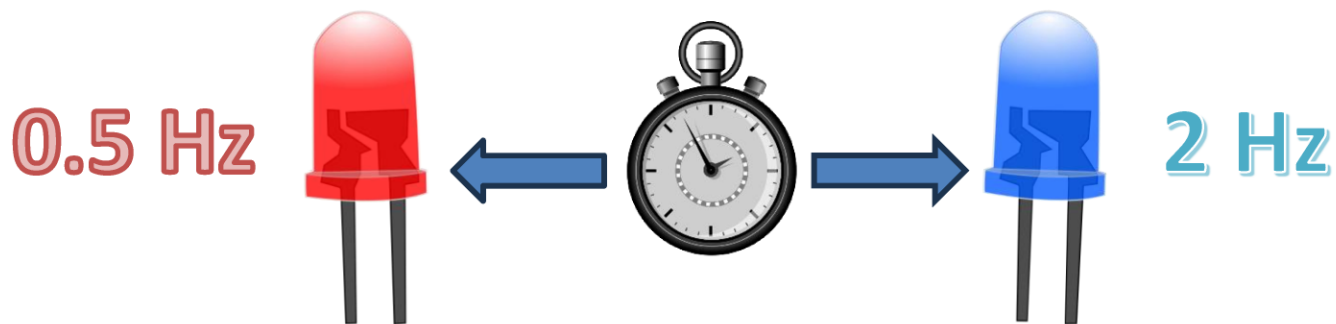
Assignment 3

- ## Controlling a Timer by a Push Button

  - Please control the LEDs of the Color Click by means of a timers and the 2x2 Key Click as follows:

    - The red LED is blinking with a frequency of 0.5 Hz.

    - The blue LED is blinking with a frequency von 2 HZ.

    - T1 turns the red blinking LED on.

    - T2 turns the red blinking LED off.

    - T3 turns the blue blinking LED on.

   - T4 turns the blue blinking LED off.
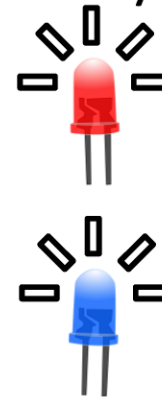
Assignment 4

- ## Buttons and External Interrupts I

  - Please control the LEDs of the Color Clicks by means of the 2x2 Key Click as follows:

    - T1 turns the red LED on.
    - T2 turns the red LED off.
    - T3 turns the blue LED on.
    - T4 turns the blue LED off.
    - The push button controls by an external interrupt
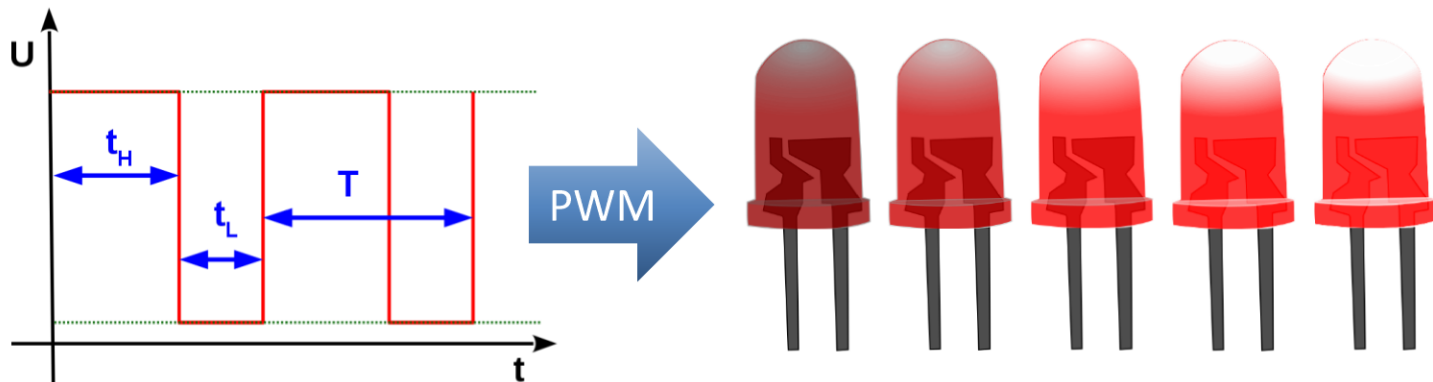   - The loop function is empty.

Assignment 5

- Buttons and External Interrupts II
  - Do the same as in assignment 4 but:
    - The red LED is blinking with a frequency of 0.5 Hz.
    - The blue LED is blinking with a frequency von 2 HZ.
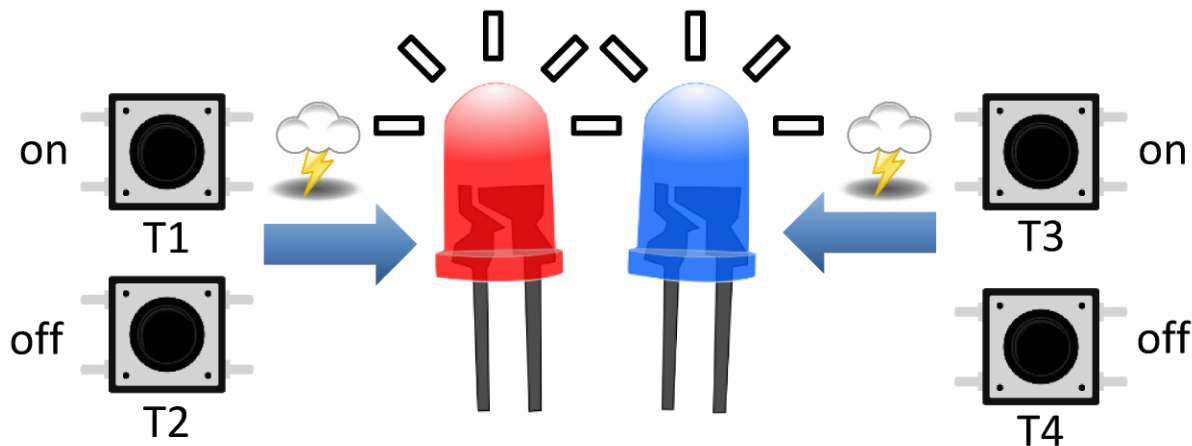
Assignment 6

- ## Pulse-width Modulation
  - Please dim the red LED of the Color Click by means of the LED control module of the ESP32.
    - The loop function remains empty.

Assignment 7

- Creating Random Colors
  - Please define an arbitrary color and display it by means of the Color Click.

```
#define red ...
#define green ...
#define blue ...

const int red = ...;
const int green = ...;
const int blue = ...;
```

PWM