Programming of Embedded Systems

Laboratory work No.3

Pulse Width Modulation (PWM)

1st Example

```
# main.py -- put your code here!
from machine import Pin
from machine import Timer

def mycallback(t):
    led.value(not led.value())


# create an output pin on pin #LED1
led = Pin("LED1", Pin.OUT)

tim = Timer()
tim.init(mode=Timer.PERIODIC, period=1000, callback=mycallback)

while True:
    pass
```

2nd Example

```
from pyb import Pin, Timer


# LED1 is on  TIM3, CH3
p = Pin("LED1")
# set TIM3 frequecy to 1000Hz
tim = Timer(3, freq=1000)
# configure timer in PWM mode on channel 3
ch = tim.channel(3, Timer.PWM, pin=p)
# set duty to 50%
ch.pulse_width_percent(25)

while True:
       pass
```

Individual task:

Microcontroller: STM32F756ZG
Board: Nucleo F756ZG
Compiler: MicroPhyton

Write a program to create a fading LED effect on LEDx. Control a LEDx brightness using a PWM (TIMx, CHx) signal with indicated frequency. Use timer interrupt callback to change LED brightness.

Table 1

No.	Pin	TIMx, CHx	PWM frequency, Hz
1	LED1	TIM1, CH2	2000
2	LED1	TIM8, CH2	2500
3	LED2	TIM4, CH2	3000
4	LED3	TIM1, CH2	3500
5	LED3	TIM8, CH2	4000
6	LED3	TIM12, CH1	4500
7	LED1	TIM1, CH2	5000
8	LED1	TIM8, CH2	5500
9	LED2	TIM4, CH2	6000
10	LED3	TIM1, CH2	6500
11	LED3	TIM8, CH2	7000
12	LED3	TIM12, CH1	7500
13	LED1	TIM1, CH2	8000
14	LED1	TIM8, CH2	8500
15	LED2	TIM4, CH2	9000
16	LED3	TIM1, CH2	9500
17	LED3	TIM8, CH2	10000
18	LED3	TIM12, CH1	10500
19	LED1	TIM1, CH2	11000
20	LED1	TIM8, CH2	11500
21	LED2	TIM4, CH2	12000

22	LED3	TIM1, CH2	12500
23	LED3	TIM8, CH2	13000
24	LED3	TIM12, CH1	13500
25	LED1	TIM1, CH2	14000
26	LED1	TIM8, CH2	14500
27	LED2	TIM4, CH2	15000
28	LED3	TIM1, CH2	15500
29	LED3	TIM8, CH2	16000
30	LED3	TIM12, CH1	16500

Report:

1. The aim of the laboratory work.
2. Variant No and data.
3. Program algorithm.
4. Program body with comments.
5. Conclusions.