Lab 2 Report

Tobias L & Özgun M (Group 5)

April 7, 2016

The purpose of the lab was to learn the interaction between button and LEDs and also learning how time works between different processes. The main goal of this lab was to learn how to create a breathing LED through the use of a pulse function using a pwm-struct. By calculating how much time a process will take depending on how high the frequency is, one was able to create a formula for how long the LED will be turned on and vice versa. The result of the formula was put into a nanosleep-function as an argument.

```
#define BILLION 1000000000L
struct timespec lightOn, lightOff;
    lightOn.tv_sec = 0;
    lightOff.tv_sec = 0;
    lightOn.tv_nsec = 1.0 / pwm.frequency * dutyPercent * BILLION;
    lightOff.tv_nsec = 1.0 / pwm.frequency * (1.0 - dutyPercent) * ↩
        BILLION;
```

The BILLION-multiplier converts the result of the formula to nanoseconds and runs the program for the calculated length of the pulse.

```
    onOff(pwm.pio, ON);
    nanosleep(&lightOn, NULL);
    onOff(pwm.pio, OFF);
    nanosleep(&lightOff, NULL);
```

One problem that was encountered, was in assignment A2 in this specific code section:

```
#define BREATHECYCLES 100
        for (float i = 0; i < BREATHECYCLES; i++)
        {
            pwmPulse(led_4, i / 100);
            pwmPulse(led_5, 1.0 - i / 100);
        }
        for (float i = BREATHECYCLES; i > 0; i--)
        {
            pwmPulse(led_4, i / 100);
            pwmPulse(led_5, 1.0 - i / 100);
        }
```

At first in the 2nd argument of pwnPulse, a different formula was used before:

```
pwmPulse(led_4, 1 / (BREATHECYCLES - i);
```

What wasn't noticed until later was that when this code was run, the 2nd argument at some point received the value 1/2 which is 0.5. This means that it's not a linear curve and the pulse becomes inconsistent. When it was changed to

```
pwmPulse(led_4, i / 100);
```

the pulse was clearly pulsing in a more consistent way.

Commentary

The difficulty of the lab was fairly easy, represented by a 4 in a scale of 1-10. Eventhough there wasn't much that was learned in the process, it would've been a bit more challenging if one could create more of the code from scratch instead of using premade code. For example, it would be good to know what's going on inside of piodirect by at least making students create some of the code inside of it, instead of giving the complete file to be used. If one would compare this lab 2 to lab 1, this lab was obviously a lot harder than lab 1. I don't know if lab 1 should be called a lab since it didn't feel like it should be named like it because of how easy it was. Maybe in that lab the students can in the future at least complete a half-completed piodirect, so that they know what they're coding with and how it works.