

# Lab 1: François SOULIÉ

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Link to your Digital-electronics-2 GitHub repository:

<https://github.com/francois07/digital-electronics-2>

## Blink example

1. What is the meaning of the following binary operators in C?

- `|` : OR
- `&` : AND
- `^` : XOR
- `~` : ONE'S COMPLEMENT
- `<<` : left shift
- `>>` : right shift

2. Complete truth table with operators: `|`, `&`, `^`, `~`

<b>b</b>	<b>a</b>	<b>b or a</b>	<b>b and a</b>	<b>b xor a</b>	<b>not b</b>
0	0	0	0	0	1
0	1	1	0	1	1
1	0	1	0	1	0
1	1	1	1	0	0

## Morse code

1. Listing of C code with syntax highlighting which repeats one "dot" and one "comma" (BTW, in Morse code it is letter A) on a LED:

```
int main(void)
{
    // Set pin as output in Data Direction Register
    // DDRB = DDRB or 0010 0000
    DDRB = DDRB | (1<<LED_GREEN);

    // Set pin LOW in Data Register (LED off)
    // PORTB = PORTB and 1101 1111
    PORTB = PORTB & ~(1<<LED_GREEN);

    // Infinite Loop
    while (1)
    {
        _delay_ms(SHORT_DELAY*4);
```

```

// Turn LED on for 1 second (dot)
PORTB = PORTB ^ (1<<LED_GREEN);
_delay_ms(SHORT_DELAY*4);

// Turn LED off for 1 second (space)
PORTB = PORTB & ~(1<<LED_GREEN);
_delay_ms(SHORT_DELAY*4);

// Turn LED on for 3 seconds (dash)
PORTB = PORTB ^ (1<<LED_GREEN);
_delay_ms(SHORT_DELAY*4*3);

// Turn LED off
PORTB = PORTB & ~(1<<LED_GREEN);
}

// Will never reach this
return 0;
}

```

2. Scheme of Morse code application, i.e. connection of AVR device, LED, resistor, and supply voltage. The image can be drawn on a computer or by hand. Always name all components and their values!

