

Lab 1: Ondřej Soukeník

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Blink example

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

OR
- &

AND
- ^

NOR
- ~

NOT
- <<

left bitwise shift
- >>

right bitwise shift

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

b	a	b or a	b and a	b xor a	not b
0	0	0	0	0	1
0	1	1	0	1	0
1	0	1	0	1	1
1	1	1	1	0	0

Morse code

1. Listing of C code with syntax highlighting which repeats one "dot" and one "comma" on a LED:

```
/* Function definitions -----*/
/*****
 * Function: dot function for displaying dot in Morse code on LED
 * Returns: none
 *****/
void dot()
{
    // Invert LED in Data Register
    // PORTB = PORTB xor 0010 0000
    PORTB = PORTB ^ (1<<LED_GREEN);
    _delay_ms(DOT_DELAY);
    PORTB = PORTB ^ (1<<LED_GREEN);
    _delay_ms(INTER_DELAY);
}
/*****
 * Function: dash function for displaying dash in Morse code on LED
 * Returns: none
 *****/
void dash()
{
    PORTB = PORTB ^ (1<<LED_GREEN);
    _delay_ms(DASH_DELAY);
    PORTB = PORTB ^ (1<<LED_GREEN);
    _delay_ms(INTER_DELAY);
}
/*****
 * Function: Main function where the program execution begins
 * Purpose: Display on LED in Morse code "DE2"
 * Returns: none
 *****/
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)
    {
        // "DE2" in Morse code "-.. . --"
        dash();
        dot();
        dot();
        _delay_ms(CHAR_DELAY);
        dot();
        _delay_ms(CHAR_DELAY);
        dot();
        dot();
        dash();
        dash();
        dash();
        _delay_ms(WORD_DELAY);
    }

    // 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!

