

# Lab 2: Pavlo Shemenba

Link to my Digital-electronics-2 GitHub repository:

<https://github.com/xshele01/Digital-electronics-2>

## Active-low and active-high LEDs

1. According to the AVR manual:

DDRB	Description
0	Input pin
1	Output pin

PORTB	Description
0	Output LOW value
1	Output HIGH value

DDRB	PORTB	Direction	Internal pull-up resistor	Description
0	0	input	no	Tri-state, high-impedance
0	1	input	yes	Pxn will source current if ext. pulled low
1	0	output	no	Output Low (Sink)
1	1	output	no	Output High (Source)

2. Part of the C code, which blinks alternately with a pair of LEDs; one LED is connected to port B and the other to port C:

```

int main(void)
{
    // Green LED at port B
    // Set pin as output in Data Direction Register...
    DDRB = DDRB | (1<<LED_GREEN);
    // ...and turn LED off in Data Register
    PORTB = PORTB & ~(1<<LED_GREEN);

    // Configure the second LED at port C
    // Set pin as output in Data Direction Register...
    DDRC = DDRC | (1<<LED_BREADBOARD);
    // ...and turn LED off in Data Register
    PORTC = PORTC & ~(1<<LED_BREADBOARD);

    // Infinite loop
    while (1)
    {
        // Pause several milliseconds
        _delay_ms(BLINK_DELAY);

        PORTB = PORTB ^ (1<<LED_GREEN);
        PORTC = PORTC ^ (1<<LED_BREADBOARD);
    }

    // Will never reach this
    return 0;
}

```

## Push button

Part of the C code, which toggles LEDs when a push button is pressed. Otherwise, the values of the LEDs do not change. The button is connected to port D:

```

// Configure Push button at port D and enable internal pull-up resistor
DDRD = DDRD & ~(1<<PUSH_BREADBOARD);
PORTD = PORTD | (1<<PUSH_BREADBOARD);

// Infinite loop
while (1)
{
    // Pause several milliseconds
    _delay_ms(BLINK_DELAY);

    if(bit_is_clear(PIND, PUSH_BREADBOARD))
    {
        PORTB = PORTB ^ (1<<LED_GREEN);
        PORTC = PORTC ^ (1<<LED_BREADBOARD);
        loop_until_bit_is_set(PIND, PUSH_BREADBOARD);
    }
}

```

## Knight Rider

Scheme of Knight Rider application (connection of AVR device, LEDs, resistors, push button and supply voltage):

