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)

1. 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_BREADBOAD);
    // ...and turn LED off in Data Register
    PORTC = PORTC & ~(1<<LED_BREADBOAD);

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

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

    // Will never reach this
    return 0;
}
```

Push button

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

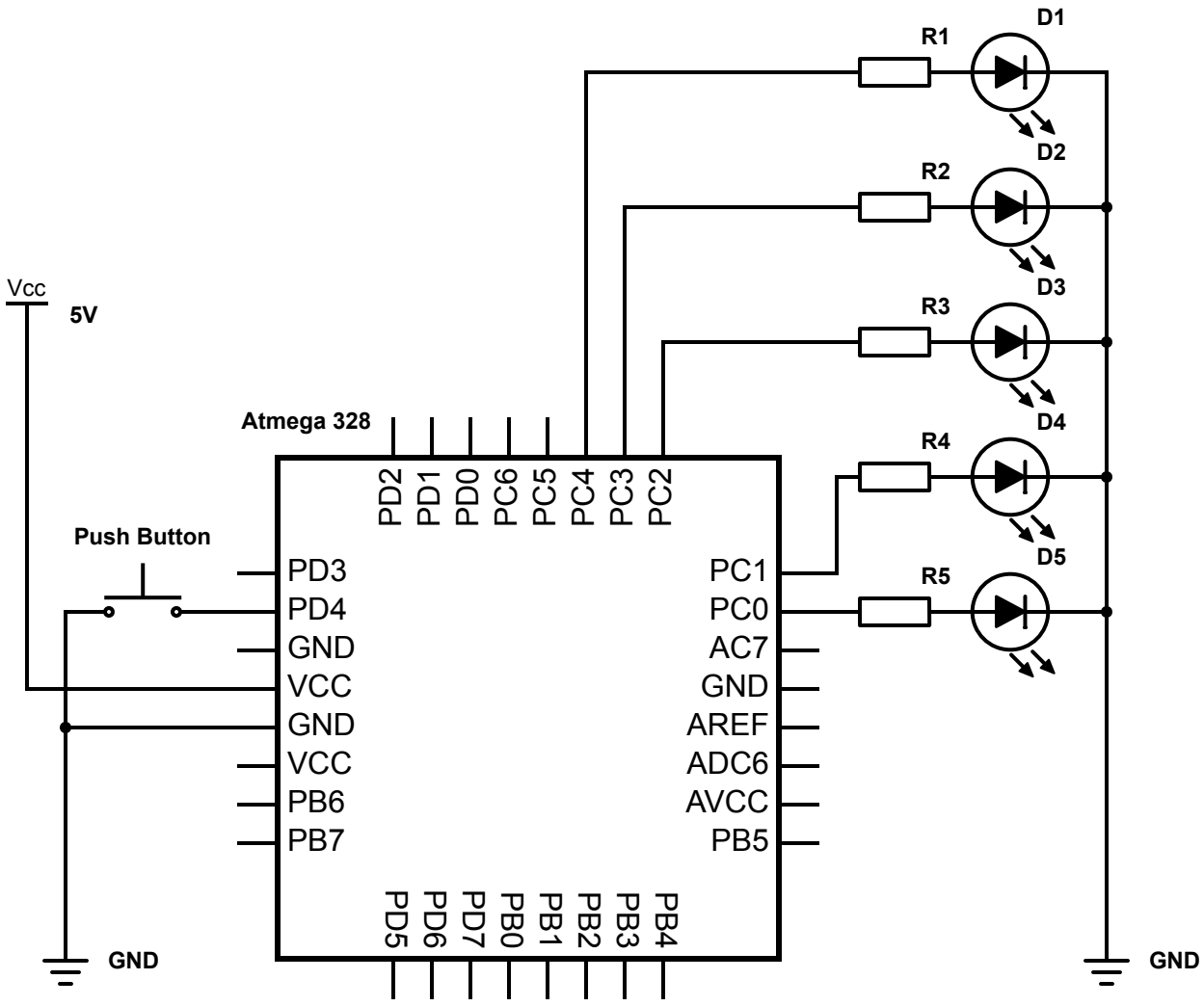
```
// Configure Push button at port D and enable internal pull-up resistor
DDRD = DDRD & ~(1<<PUSH_BREADBOAD);
PORTD = PORTD | (1<<PUSH_BREADBOAD);

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

    if(bit_is_clear(PIND, PUSH_BREADBOAD))
    {
        PORTB = PORTB ^ (1<<LED_GREEN);
        PORTC = PORTC ^ (1<<LED_BREADBOAD);
        loop_until_bit_is_set(PIND, PUSH_BREADBOAD);
    }
}
```

Knight Rider

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


Vcc
5V
Atmega 328
Push Button
PD2
PD1
PD0
PC6
PC5
PC4
PC3
PC2
PD3
PD4
GND
VCC
GND
VCC
PB6
PB7
PC1
PC0
AC7
GND
AREF
ADC6
AVCC
PB5
PD5
PD6
PD7
PB0
PB1
PB2
PB3
PB4
R1
R2
R3
R4
R5
D1
D2
D3
D4
D5
GND
GND