Lab 1: Pavel Vaněk

Link to my `Digital-electronics-2` GitHub repository:

https://github.com/Bobik77/Digital-electronics-2

Blink example

1. What is the meaning of the following binary operators in C?
   - `|` Operátor log. součtu (OR)
   - `&` Operátor log. součinu (AND)
   - `^` Operátor log. výlučného součtu (XOR)
   - `~` Operátor log. negace (NOT)
   - `<<` Operátor bitového posunu vlevo (left shift)
   - `>>` Operátor bitového posunu vpravo (right 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	1
1	0	1	0	1	0

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

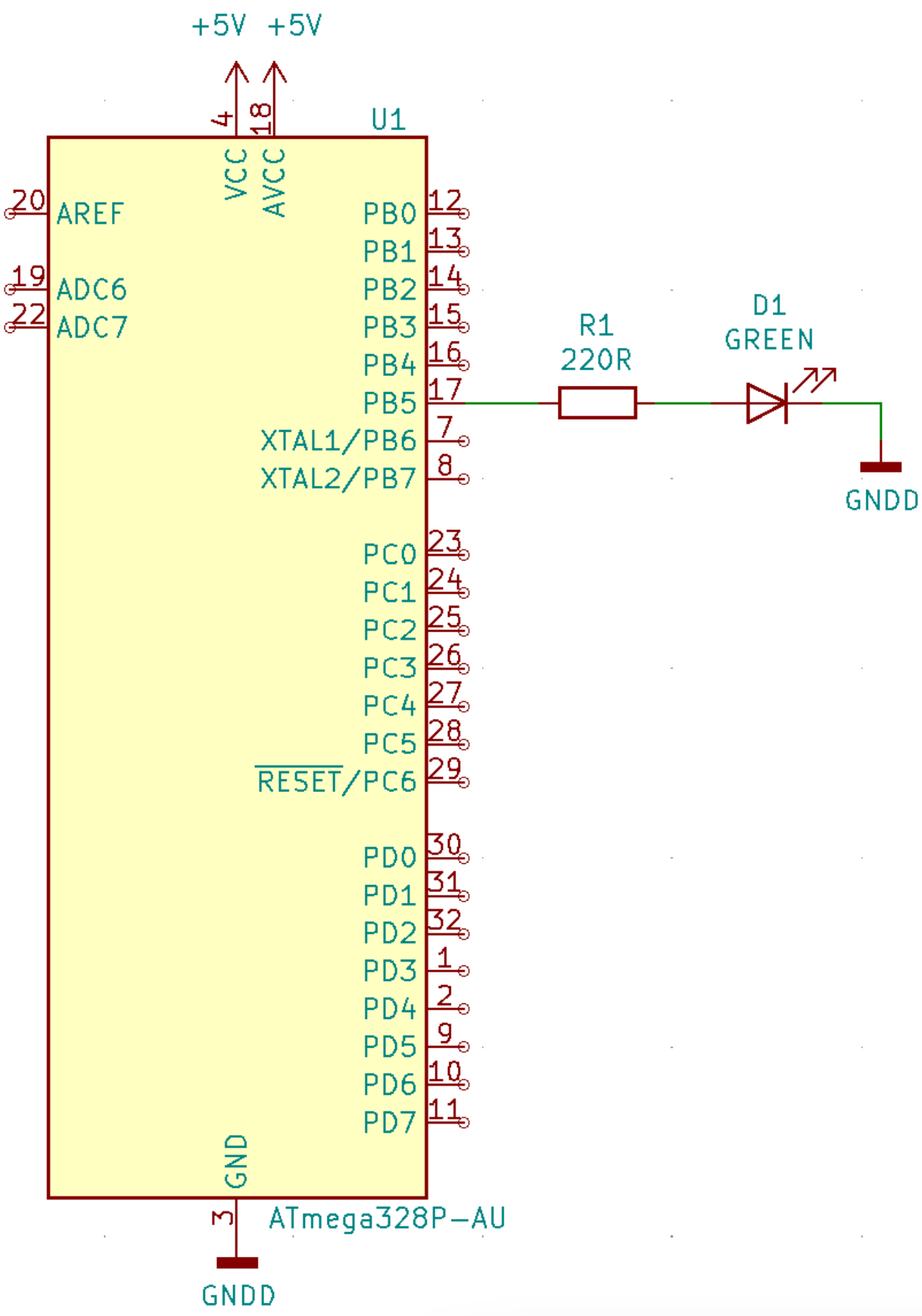
Morse code

1. Listing of C code with syntax highlighting which send "HELLO" message via LED

```
// morse marks durations in ms
#define dit 100         // . change speed here
#define dash 3*dit     // -
#define gap_length dit  // gap between marks
#define short_space_length 3*dit // between letters
#define long_space_length 5*dit // between words

/* Function definitions ----------------------------------------------*/
/**************************************************************************
 * Purpose: Delay defined time in ms
 **************************************************************************/
void my_delay_ms(int n)
{
        while(n--) {
                _delay_ms(1);
        }
}

/**************************************************************************
 * Purpose:  Send dit or dash mark
 **************************************************************************/
void send_mark(int mark_length)
{   //mark_lenght in ms

        DDRB = DDRB | (1<<LED_GREEN);   //turn on LED
        my_delay_ms(mark_length);               //mark delay
        PORTB = PORTB & ~(1<<LED_GREEN);//turn off LED
        my_delay_ms(gap_length);                //gap between marks
}

/**************************************************************************
 * Function: Main function where the program execution begins
 * Purpose:  Sending hello message in loop in morse code via LED
 * 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)
    {   //H
        send_mark(dit);
        send_mark(dit);
        send_mark(dit);
        send_mark(dit);
        _delay_ms(short_space_length);
        //E
        send_mark(dit);
        _delay_ms(short_space_length);
        //L
        send_mark(dit);
        send_mark(dash);
        send_mark(dit);
        send_mark(dit);
        _delay_ms(short_space_length);
        //L
        send_mark(dit);
        send_mark(dash);
        send_mark(dit);
        send_mark(dit);
        _delay_ms(short_space_length);
        //O
        send_mark(dash);
        send_mark(dash);
        send_mark(dash);
        _delay_ms(short_space_length);
        //W
        send_mark(dit);
        send_mark(dash);
        send_mark(dash);
        _delay_ms(long_space_length);
    }

    // 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!


+5V
+5V
4
18
U1
VCC
AVCC
20
AREF
19
ADC6
22
ADC7
PB0
PB1
PB2
PB3
PB4
PB5
XTAL1/PB6
XTAL2/PB7
PC0
PC1
PC2
PC3
PC4
PC5
RESET/PC6
PD0
PD1
PD2
PD3
PD4
PD5
PD6
PD7
12
13
14
15
16
17
7
8
23
24
25
26
27
28
29
30
31
32
1
2
9
10
11
R1
220R
D1
GREEN
GNDD
GND
3
ATmega328P-AU
GNDD