Lab 4: FILIP KOCUM

github link of my repository

Overflow times

1. Complete table with overflow times.

Module	Number of bits	1	8	32	64	128	256	1024
Timer/Counter0	8	16u	128u	--	1024 u	--	4.096 m	16.384 m
Timer/Counter1	16	4.096 m	32.768 m	--	262.144 m	--	1.048576	4.194304 s

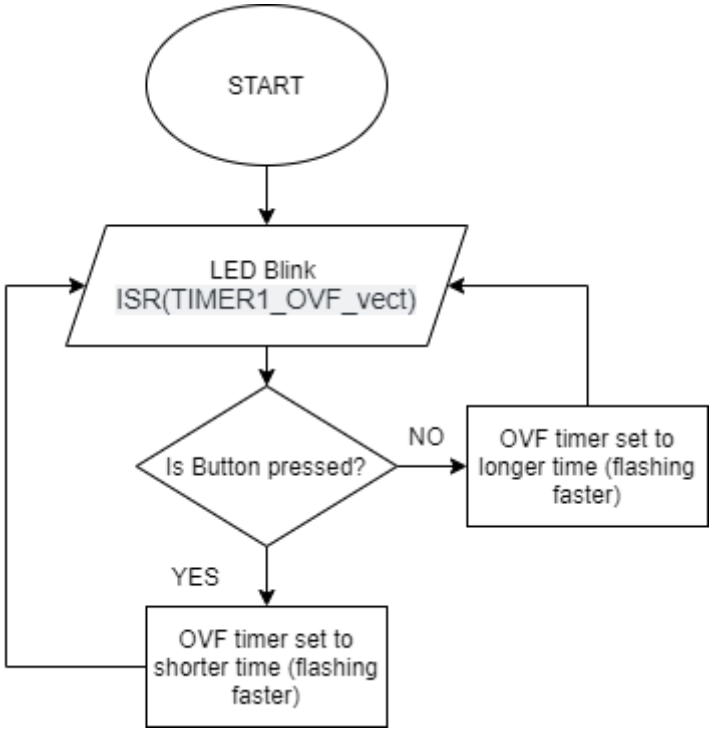
Module	Number of bits	1	8	32	64	128	256	1024
Timer/Counter2	8	16u	128u		1024 u	512u	4096 u	16.384 m

Timer library

1. In your words, describe the difference between common C function and interrupt service routine.
   - Function - funguje jako callback, vykoná příkazy.
   - Interrupt service routine - zastaví program a vykoná jednoduché příkazy.
2. Part of the header file listing with syntax highlighting, which defines settings for Timer/Counter0:

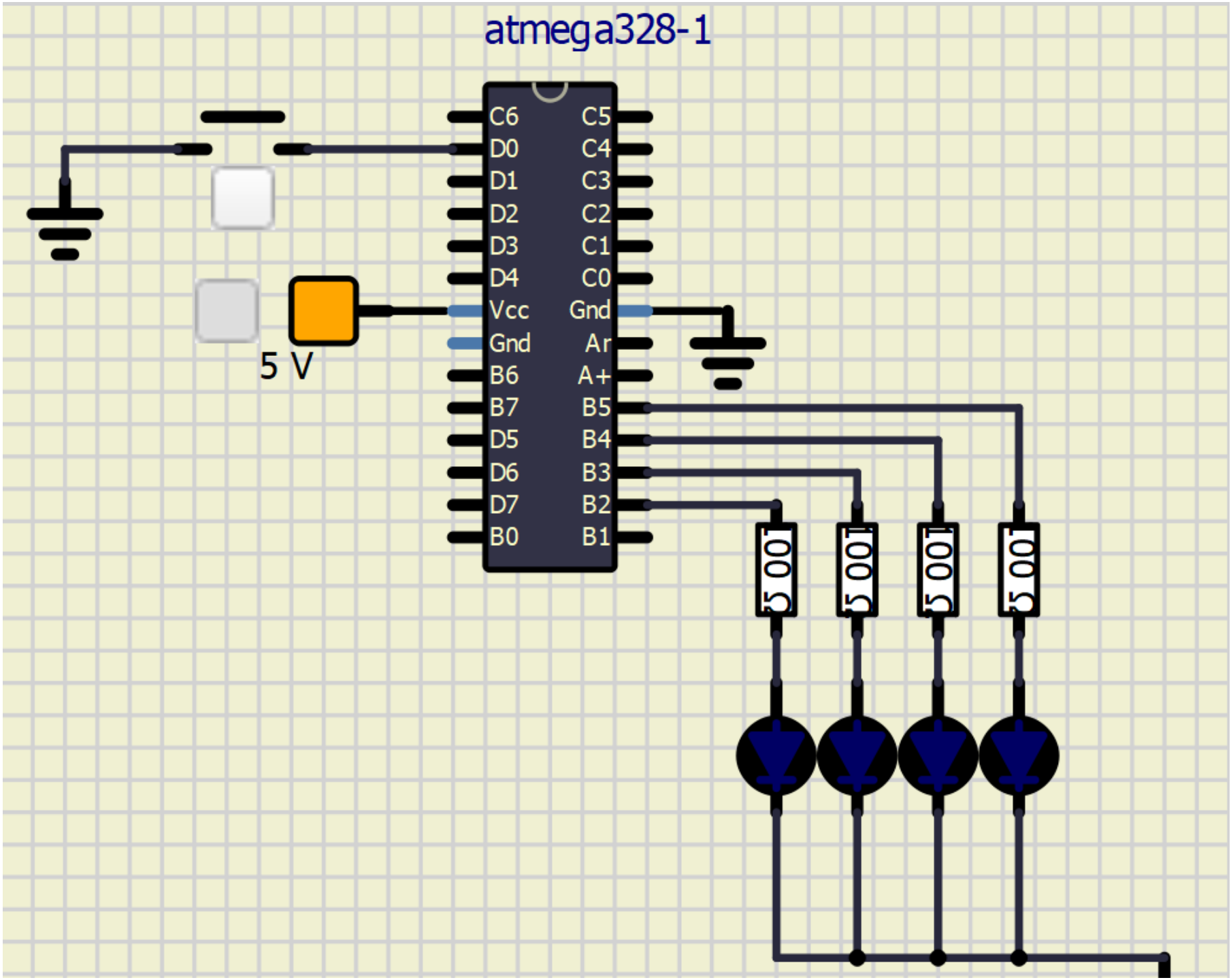
```
/**
 * @name  Definitions for 8-bit Timer/Counter0
 * @note  t_OVF = 1/F_CPU * prescaler * 2^n where n = 8, F_CPU = 16 MHz
 */
#define TIM1_stop()           TCCR0B &= ~((1<<CS02) | (1<<CS01) | (1<<CS00));
/** @brief Set overflow 4ms, prescaler 001 --> 1 */
#define TIM1_overflow_4ms()   TCCR0B &= ~((1<<CS02) | (1<<CS01)); TCCR0B |= (1<<CS00);
/** @brief Set overflow 33ms, prescaler 010 --> 8 */
#define TIM1_overflow_33ms()  TCCR0B &= ~((1<<CS02) | (1<<CS00)); TCCR0B |= (1<<CS01);
/** @brief Set overflow 262ms, prescaler 011 --> 64 */
#define TIM1_overflow_262ms() TCCR0B &= ~(1<<CS02); TCCR0B |= (1<<CS01) | (1<<CS00);
/** @brief Set overflow 1s, prescaler 100 --> 256 */
#define TIM1_overflow_1s()    TCCR0B &= ~((1<<CS01) | (1<<CS00)); TCCR0B |= (1<<CS02);
/** @brief Set overflow 4s, prescaler // 101 --> 1024 */
#define TIM1_overflow_4s()    TCCR0B &= ~(1<<CS01); TCCR0B |= (1<<CS02) | (1<<CS00);
/** @brief Enable overflow interrupt, 1 --> enable */
#define TIM1_overflow_interrupt_enable()  TIMSK0 |= (1<<TOIE0);
/** @brief Disable overflow interrupt, 0 --> disable */
#define TIM1_overflow_interrupt_disable() TIMSK0 &= ~(1<<TOIE0);
```

3. Flowchart figure for function `main()` and interrupt service routine `ISR(TIMER1_OVF_vect)` of application that ensures the flashing of one LED in the timer interruption. When the button is pressed, the blinking is faster, when the button is released, it is slower. Use only a timer overflow and not a delay library.



Knight Rider

1. Scheme of Knight Rider application with four LEDs and a push button, connected according to Multi-function shield. Connect AVR device, LEDs, resistors, push button, and supply voltage. The image can be drawn on a computer or by hand. Always name all components and their values!


atmega328-1
C6
D0
D1
D2
D3
D4
Vcc
Gnd
B6
B7
D5
D6
D7
B0
C5
C4
C3
C2
C1
C0
Gnd
Ar
A+
B5
B4
B3
B2
B1
5 V
5 001
5 001
5 001
5 001