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King Mongkut's University of Technology Thonburi

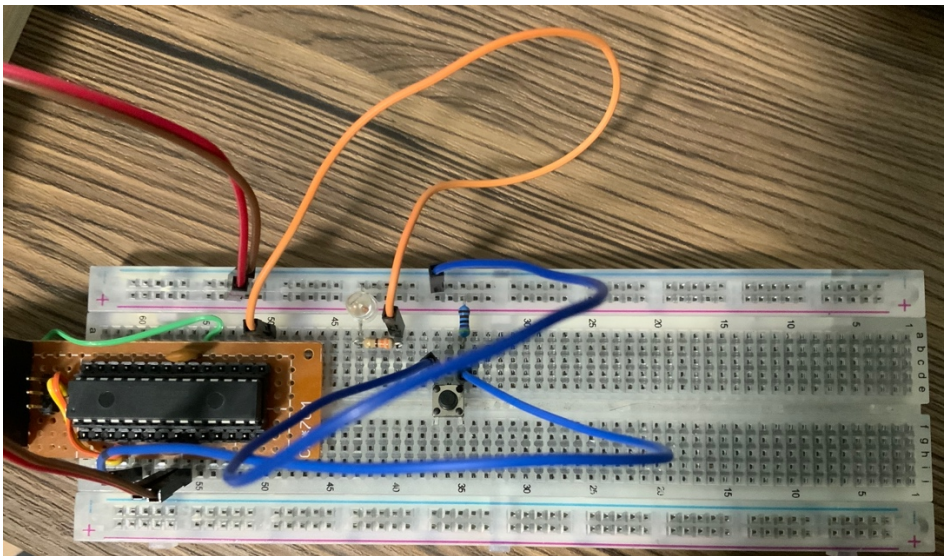
Faculty of Engineering, Department of Computer Engineering

CPE 328 Embedded System, 2/2020

LAB Lecture 7: AVR Timer/Interrupt

Assign Date: 17 Mar 2021 Due Date: 23 Mar 2021

On board



Code

Polling

```
#define F_CPU 8000000L
#include <avr/io.h>
#include <util/delay.h>

#define BUTTON PD2
#define LEB PB1

void init_timer1(uint16_t count){
    TCCR1A |= (1 << COM1A0);               // Open toggle mode on OC1A/OC1B
    TCCR1B |= (1 << WGM12) | (1 << CS12);  // Set CTC mode and clk/256
    OCR1A = count;
}

void start_timer1(){
    TCCR1B |= (1 << CS12);     // Set clk/256
}

void stop_timer1(){
    TCCR1B &= ~(1 << CS12);    // No clock source
}
```

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```c
int main(void) {

    /* Init LED*/
    DDRB |= (1 << LEB);
    PORTB &= ~(1 << LEB);

    int flag = 0;

    /* Init Timer  */
    init_timer1(31250);

    while (1) {
        /* Button push for toggle  */
        if((PIND & (1 << BUTTON)) == 0) {
            if(flag)
                flag = 0;
            else
                flag = 1;

            _delay_ms(10);

            while((PIND & (1 << BUTTON)) == 0);
            _delay_ms(10);
        }

        /* Toggle start or stop timer  */
        if(flag){
            start_timer1();
        } else{
            stop_timer1();
        }
    }
}
```

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Interrupt

```c
#define F_CPU 8000000L

#include <avr/io.h>
#include <avr/interrupt.h>
#include <util/delay.h>

#define BUTTON PD2
#define LEB PB1

volatile int flag = 0;

/* For interrupt case INT0 */
ISR(INT0_vect){
    if (flag == 1) {
        flag = 0;
        start_timer1();
    } else {
        flag = 1;
        stop_timer1();
    }
}

void init_int0() {
    EICRA |= (1 << ISC01); // Falling edge of INT0 generate an interrupt reuest
    EIMSK |= (1 << INT0); // Enable External Interrupt request 0
}

void init_timer1(uint16_t count){
    TCCR1A |= (1 << COM1A0);   // Open toggle mode on OC1A/OC1B
    TCCR1B |= (1 << WGM12) | (1 << CS12);   // Set CTC mode and clk/256
    OCR1A = count;
}
```

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```c
void start_timer1(){
    TCCR1B |= (1 << CS12);    // Set clk/256
}

void stop_timer1(){
    TCCR1B &= ~(1 << CS12);   // No clock source
}

int main(void) {

    /* Init LED*/
    DDRB |= (1 << LEB);
    PORTB &= ~(1 << LEB);

    /* Init Timer */
    init_timer1(31250);

    /* Init Interrupt */
    init_int0();
    sei();

    while (1) {
    }
}
```

1) Design a code and circuit to blink a led by use pooling and interrupt

Result