**Activity 1**

Write a program to get data from port B and send it to port C continuously while an interrupt will do the following: One of the timers will toggle pin PB1 every 100 microseconds.

Question does not specifiy which timer/mode/prescalar to use, so I used timer 1 in normal mode w/ no prescalar. I know it says to toggle pin PB1, but Dr. Adla told us in class to use D1 since PORTB and PORTC are already all being used.

int main(void)

{

//data direction

DDRB = 0x00;

DDRC = 0xFF;

DDRD |= 1<<1;

//timer setup, normal mode w/ no prescalar

TCCR1A = 0x00;

TCCR1B = 0x01;

//set TCNT1 appropriately

TCNT1 = 63936;

//interrupt setup, and enable global interrupt

TIMSK1 = 1<<TOIE1;

sei();

//wait here, send data

while (1) {

PORTC = PINB;

}

return 0;

}

ISR(TIMER1\_OVF\_vect) {

//reset counter for the square wave

TCNT1 = 63936;

//upon interrupt starting, toggle pin 1 on PORTD per rawa's instructions

PORTD ^= 1<<1;

//don’t need to change TOV flag or reset clock w/ TCCR1B as the interrupt does it for you

}

**YouTube Link:**

**Activity 2**

Add the following interrupt to Activity 1:

Assume a square wave is connected to an external interrupt, and any time a L-to-H pulse comes in, a single LED connected to PB2 is turned on, and any time a H-to-L pulse comes in, the LED is turned off.

The rate of "On" and "Off" is the same as the square wave frequency.

int main(void)

{

//data direction, port B all input, port C all output, port D1 is output, ports D2/D3 are input

DDRB = 0x00;

DDRC = 0xFF;

DDRD |= 1<<1;

DDRD &= ~(11<<3);

//DDRD &= ~((1<<3) | (1<<2));

//timer 1 setup, normal mode w/ no prescalar

TCCR1A = 0x00;

TCCR1B = 0x01;

//set TCNT1 appropriately

TCNT1 = 63936;

//interrupt masks

EIMSK = 1<<INT0 | 1<<INT1;

TIMSK1 = 1<<TOIE1;

//external interrupt setup (INT 0 is low to high, INT1 is high to low, EICRA = 0000 1110

EICRA = 0x0E;

//enable global interrupt

sei();

//for activity 2, turn LED off initially

PORTD &= ~(1<<2);

//wait here, send data

while (1) {

PORTC = PINB;

}

return 0;

}

ISR(TIMER1\_OVF\_vect) {

//reset counter for the square wave

TCNT1 = 63936;

//upon interrupt starting, toggle pin 1 on PORTD per rawa's instructions

PORTD ^= 1<<1;

//don’t need to change TOV flag or reset clock w/ TCCR1B as the interrupt does it for you

}

ISR(INT0\_vect) {

//int0, low to high pulse, turn LED on

PORTD |= (1<<2);

}

ISR(INT1\_vect) {

//int 1, high to low pulse, turn LED off

PORTD &= ~(1<<2);

}

**YouTube Link:**