CPE301 – SPRING 2024
Design Assignment 3

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Directory:
Video Playlist:

TASK 1

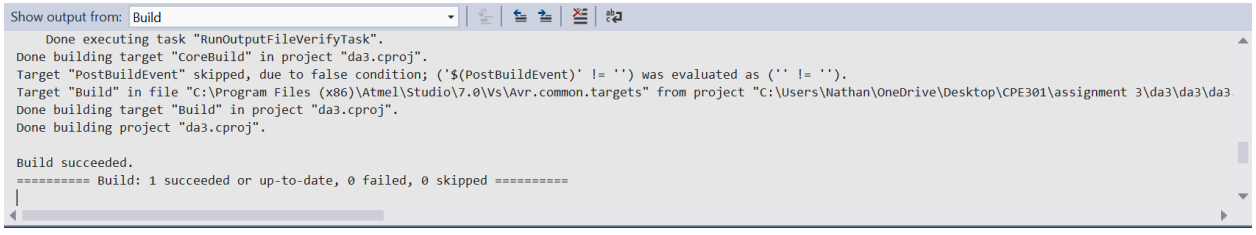
```
#include <avr/io.h>
#define F_CPU 16000000;

unsigned int counter = 0;

int main(void)
{
	DDRB |= (1 << PINB5); // PB5 is an output
	// Set the Timer Mode to normal
	// prescalar set to 64
	TCCR0B |= (1 << CS01) | (1 << CS00);
	// initialize counter
	TCNT0 = 0;
	while(1) {

		// check if 0.1ms has been reached
		if (TCNT0 == 24) {
			counter++;
			TCNT0 = 0;
		}
		// check for 10,000 ticks of 0.1ms (aka 1 second delay)
		if(counter == 10000) {
			PORTB ^= (1 << PINB5); // EORs PINB5, thus blinking it
			counter = 0;
		}
	}
}
```

COMPILATION SUCCESS



TASK 2

```
#include <avr/io.h>
#include <avr/interrupt.h>
#define F_CPU 16000000;

unsigned int counter = 0;
```

```
ISR(TIMER1_COMPA_vect) {
	cli();
	counter++;
	sei();
}

int main(void)
{
	DDRB |= (1 << PINB4); // PB4 is an output
	// Set the Timer Mode to CTC
	// Sets CS1 to 0b101 -> prescalar 256; finish WGM1 to be 0b0100 for CTC
	TCCR1B |= (1 << WGM12) | (1 << CS12);
	TIMSK1 |= (1 << OCIE1A); // sets bit to enable Comparator A
	OCR1A = 0x1F; //0x7A11 for 0.1ms delays
	// initialize counter
	TCNT1 = 0;
	sei();
	while(1) {
		if(counter == 6000) {
			PORTB ^= (1 << PINB4); // blink PINB4, LED D2
			counter = 0;
		}
	}
}
```

COMPILATION SUCCESS

```
    Done executing task "RunOutputFileVerifyTask".
Done building target "CoreBuild" in project "da3.cproj".
Target "PostBuildEvent" skipped, due to false condition; ('$(PostBuildEvent)' != '') was evaluated as ('' != '').
Target "Build" in file "C:\Program Files (x86)\Atmel\Studio\7.0\Vs\Avr.common.targets" from project "C:\Users\Nathan\OneDrive\Desktop\CPE301\assignment 3\da3\da3\da3
Done building target "Build" in project "da3.cproj".
Done building project "da3.cproj".

Build succeeded.
========== Build: 1 succeeded or up-to-date, 0 failed, 0 skipped ==========
```

TASK 3

```
#include <avr/io.h>
#include <avr/interrupt.h>
#define F_CPU 16000000;

unsigned int counter = 0;

ISR(TIMER2_OVF_vect) {
	cli();
	counter++;
	TCNT2 = 194;
	sei();
}

int main(void)
{
	DDRB |= (1 << PINB3); // PB3 is an output
	// Set the Timer Mode to Normal
	// Sets prescalar 64
	TCCR2B |= (1 << CS22);
```

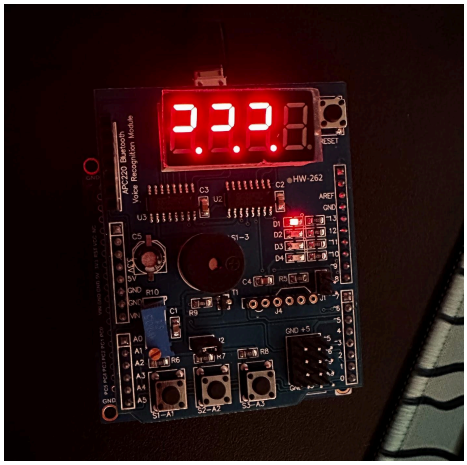
```
	// enable overflow interrupt
	TIMSK2 |= (1 << TOIE2);
	// initialize counter so that there is 0.25ms left before it overflows
	TCNT2 = 194;
	sei();
	while(1) {
		// check for 8000 ticks of 0.25ms (aka 2 seconds)
		if(counter == 8000) {
			PORTB ^= (1 << PINB3); // blink PINB3, LED D3
			counter = 0;
		}
	}
}
```

COMPILATION SUCCESS

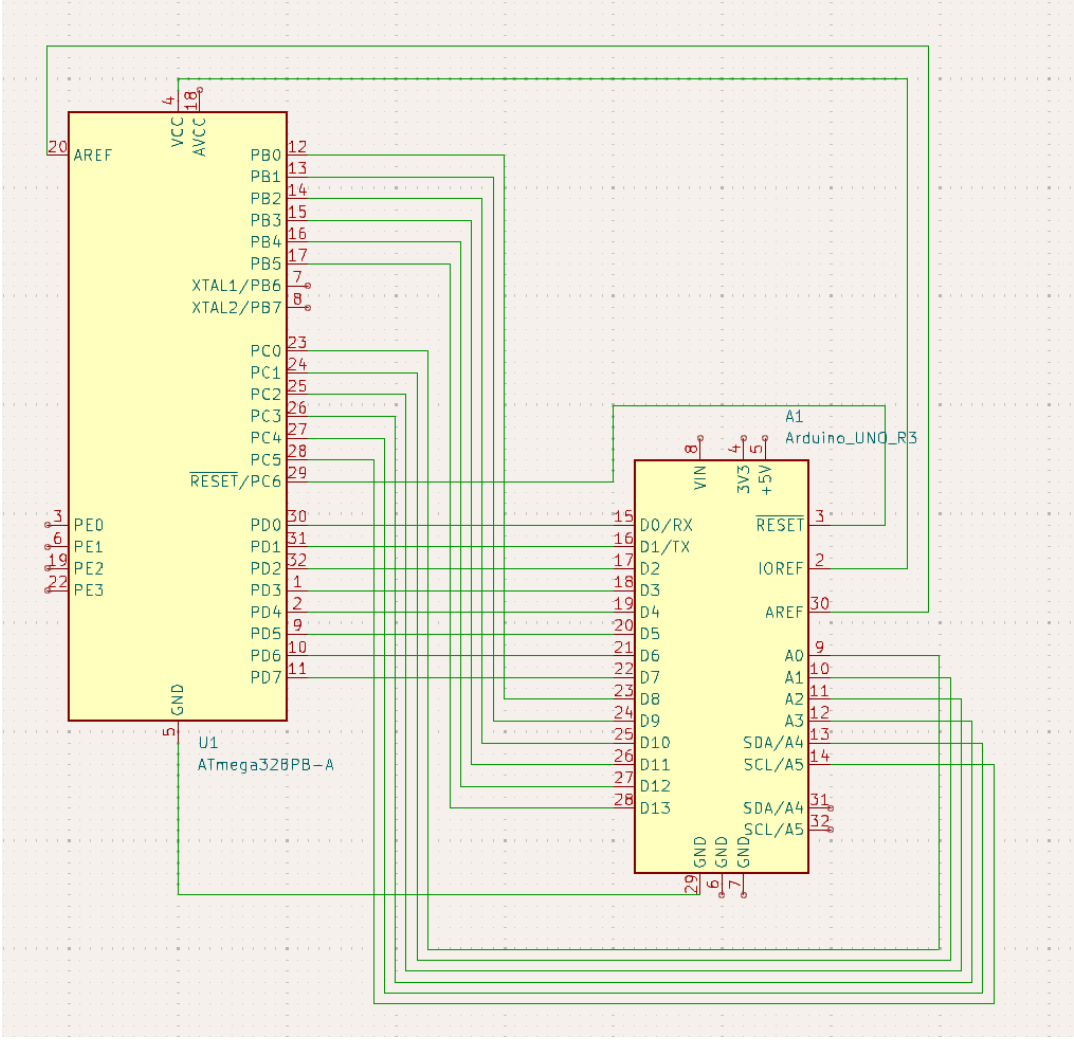
```
    Done executing task "RunOutputFileVerifyTask".
Done building target "CoreBuild" in project "da3.cproj".
Target "PostBuildEvent" skipped, due to false condition; ('$(PostBuildEvent)' != '') was evaluated as ('' != '').
Target "Build" in file "C:\Program Files (x86)\Atmel\Studio\7.0\Vs\Avr.common.targets" from project "C:\Users\Nathan\OneDrive\Desktop\CPE301\assignment 3\da3\da3\da3
Done building target "Build" in project "da3.cproj".
Done building project "da3.cproj".

Build succeeded.
========== Build: 1 succeeded or up-to-date, 0 failed, 0 skipped ==========
```

Board Setup for all 3 tasks



KiCAD Schematics



Demo of All 3 Tasks: https://youtu.be/aZAYZcGmfsE

Github: https://github.com/n8ramos/atmega328pb