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Class:	CpE 301: Embedded System Design		Semester:	Spring 2016
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		Document topic:	Postlab 2: Atmel Studio Tutorial Part 1	
Instructor's comments:				

1. Introduction / Theory of Operation

The goal of this lab was to install Atmel Studio 7 and WinAVR. Also build and simulate a project in Atmel Studio 7

2. Description of Experiments

Experiment 1

Download and install Atmel Studio 7, and WinAVR. Atmel Studio 7 had already been installed previously.

Experiment 2

Download the datasheet for the Atmega328P

Experiment 3

Use installed software to create and build a project. I built blinky project demonstrated in lecture.

Code:

```
#define F_CPU 10000000UL

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

int main() {
	// Set the pin 5 at port B as output
	DDRB |= (1<<PB5);
	while(1) {
		// Turn led on by setting corresponding bit high in the PORTB register.
		PORTB |= (1<<PB5);

		_delay_ms(500);

		// Turn led off by setting corresponding bit low in the PORTB register.
		PORTB &= ~(1<<PB5);

		_delay_ms(3000);

	}
}
```

3. Encountered Problems
The only problem is that the link to download WinAVR did not respond.

4. Summary
We downloaded and installed necessary software to work with the Atmega328P and demonstrated use of the IDE to program the microcontroller, and debug it.

5. Conclusions
The IDE eases the use of the microcontroller.

6. Questions
a) Go to the Atmel website and find the Atmega328P datasheet. List some of the various functions that can be performed using the chip.

- Peripheral Features
  - Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
  - One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
  - Real Time Counter with Separate Oscillator
  - Six PWM Channels
  - 8-channel 10-bit ADC in TQFP and QFN/MLF package
    - Temperature Measurement
  - 6-channel 10-bit ADC in PDIP Package
    - Temperature Measurement
  - Programmable Serial USART
  - Master/Slave SPI Serial Interface
  - Byte-oriented 2-wire Serial Interface (Philips I^2C compatible)
  - Programmable Watchdog Timer with Separate On-chip Oscillator
  - On-chip Analog Comparator
  - Interrupt and Wake-up on Pin Change
- Special Microcontroller Features
  - Power-on Reset and Programmable Brown-out Detection
  - Internal Calibrated Oscillator
  - External and Internal Interrupt Sources
  - Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby

b) Go to Atmel's website and find another microcontroller that is similar enough to replace the Atmega328P. Explain why it would be a suitable replacement and list some of the differences from the 328P.

A potential replacement for the Atmega328P is the **Atmega325P**. It is the only difference, is that the pin count on the 325P is twice as large, but with 7 fewer external interrupts, and the maximum operating frequency is 4 MHz lower.

7. PCB and Schematic
There was no schematic used.