

CPE 301- Embedded Systems Design - Fall 2019
HOMEWORK No. 1 - DUE **before 11:59 PM** September 4

Description of Purpose

The purpose of this assignment is to teach us about microprocessors and microcontrollers. We will learn the different functions and how to operate the Arduino Mega 2560 R3 in this assignment. In addition, this assignment is designed to help us familiarize with the SBC in correlation on how different circuits will be incorporated with the SBC in lab. Overall, this assignment is a review on past course material from CPE 201 as well as an introduction on the Arduino Board that we will be using in class.

In this course you will learn about microprocessors and microcontrollers and how to design and build “Embedded Systems” to control and operate electronic devices. You will use the Arduino Mega 2560 R3 “Single Board Computer” (SBC):

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1. Read Chapter one of the textbook and **answer problems 1.5 through 1.10** at the end of Chapter one (this should be mostly a review of CPE 201 and will help you in writing up your report for #2 below).

2. Begin by going to the Arduino web site and examine the features and input/output devices of several of the different Arduino boards. Features are things like type of microprocessor or microcontroller used on the board, amount of flash memory, software available, prices etc. Input/output devices are timers (CPE201 counters), UARTs (CPE201 shift registers), general purpose input/output devices (CPE201 latches and flip-flops), and analog to digital converters (a web search will tell you more about ADCs, for example see: <https://learn.sparkfun.com/tutorials/analog-to-digital-conversion>).

Then, Perform a WEB search for “Single Board Computers”, “Embedded Controllers”, “System on a Chip”, and other search terms you might think of to examine other brands of SBCs and their features. You will use the Arduino SBC in this class as an example of modern embedded systems. However, there are many other brands of SBCs which contain the same types of input/output devices. What you learn about the Arduino can be applied to almost any modern SBC.

Write a two to four page report, in your own words, describing what you learned about at least two of the input/output devices listed above and your understanding of how they work. Include references (URLs) to any really good web pages describing or comparing SBCs.

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Be sure that you reference any quotes or figures you use from your search. It is OK to include material from other sources in your written report as long as you reference the source. ***It is not OK to just cut and paste*** from other sources and pretend you wrote the material. This is true for anything you prepare for any class, and if you do not reference the source it is considered plagiarism which is academic dishonesty.

For Example: The excerpt below is taken from the current UNR Catalog defining academic standards (UNR1).

"Academic dishonesty is against university as well as the system community standards. Academic dishonesty is defined as: cheating, plagiarism or otherwise obtaining grades under false pretenses. ...

Plagiarism is defined as submitting the language, ideas, thoughts or work of another as one's own; or assisting in the act of plagiarism by allowing one's work to be used in this fashion. ...

Cheating is defined as (1) obtaining or providing unauthorized information during an examination through verbal, visual or unauthorized use of books, notes, text and other materials; (2) obtaining or providing information concerning all or part of an examination prior to that examination; (3) taking an examination for another student, or arranging for another person to take an exam in one's place; (4) altering or changing test answers after submittal for grading, grades after grades have been awarded, or other academic records once these are official. ...

Sanctions for violations of University academic standards for academic dishonesty may include academic and/or disciplinary sanctions. Academic sanctions for both undergraduate and graduate students may include: filing a final grade of "F"; reducing the student's final course grade one or two full grade points; awarding a failing mark on the coursework in question; or requiring the student to retake or resubmit the coursework."

Note that the example above references the source and makes it clear that I am quoting from it rather than writing my own words like I am in this sentence.

In your report you should identify each reference and at the end of your report you should include a list of references which you used to gather information.

LIST OF REFERENCES:

UNR1. UNR academic standards, <http://catalog.unr.edu/content.php?catoid=13&navoid=3708> , (copied 8/22/2016)