ME 121: Homework 2

Group Assignment

1. Complete the assembly of the flow loop. Consult the checklist for expected components and capability. Designate a project leader who will be responsible for the inspection at the start of class. The flow loop requires electrical power for the pump, so the electrical power system could also be completed as part of the flow loop. The electrical power system will be inspected separately.
2. Assemble an electrical power system that uses your own 12 VDC power supply. This does not yet need to be the full power system with switches for two circuits, although there is no reason to delay. By the due date of this assignment you at least need your own power source for the pump. Do not count on using the DC power supplies from the lab.
3. Assemble the voltage divider circuit for the salinity sensor on the long breadboard. Power to the voltage divider is supplied by a digital output. Output from the voltage divider is wired to an analog input. One person on the team will use their Arduino for the group fish tank. That person will have their Arduino attached to the acrylic base plate. That person will use the Arduino and acrylic base plate in their solution to the remaining problems.

Individual Assignment

1. Write an Arduino program to measure the output of the salinity sensor. Use a photoresistor instead of the salinity sensor to debug the program. Your program should perform the following steps in a continuously repeating loop:
   a. Turn on the sensor by setting the digital output pin *HIGH*.
   b. Wait 100 milliseconds
   c. Make *n* readings of the sensor, where *n* is a variable. For testing, use *n* =15.
   d. Average the readings
   e. Convert the average value to voltage
   f. Print the voltage value to the Serial Monitor.
   g. Turn off the sensor
   h. Wait 100 milliseconds

   For step b., do not use the delay() function. Instead, please use code using the millis() function.

   Turn in a cleanly formatted version of the code, and a sample print-out of at least 10 readings.
2. Convert the code developed above so that the sensor reading occurs in a separate function, not in the *loop()* function. Your function should have three input values and one return value. The inputs are *power_pin*, the number of the digital output pin that supplies power to the voltage divider, *reading_pin*, the number of the analog

input pin, and *n* the number of readings to average. Your function should look something like the following code.

```
float read_salinty (int power_pin, int reading_pin, int n) {
   int wait_reading=100;
   float reading;
   // There are more variables to declare

   // turn on power to the voltage divider and wait

   // Make n readings and average them

   // Turn off the sensor

   return (reading);
}
```

Complete the assignment by filling in the missing code. Your code should be properly indented, i.e. not left justified. Note that a working code will need you to call your function inside the *loop()* function:

```
void loop() {
   // declare variables
   int nave=15, sensor_pin = 3;
   float value;

   value = read_salinity (sensor_power_pin, sensor_pin, nave);
   Serial·println (value);
}
```

Also note that *sensor_power_pin* needs to be a global variable since the pinMode() is set in the *setup()* function.

Turn in a cleanly formatted version of the code, and a sample print-out of at least 10 readings.