Question 1

Consider the given Task Objective. Think about how this simple system can be decomposed to 'Sense-Think-Act' as discussed in class (lecture).

    a) What is the 'sensing' requirement in this system, if any?

            Air Temperature, Humidity, Motion, Soil Moisture

    b) What is the 'thinking' requirement in this system, if any?

            Converting raw sensor data to the corrected values e.g. %, C

    c) What is the 'acting' requirement in this system, if any?

            Displaying the results on screen (Serial Monitor)

Question 2

Please refer to the provided '**Sensing Motion Activity Sheet**' and follow the steps.

    a) Refer to the given code in HCSR505motion.ino. What does the following line mean?

```
Serial.begin(9600);
```

        Serial.Begin(9600) initialises the serial port and sets it with a baud rate of 9600bps

    b) If the Arduino transfers data at 4800 bits per second and you're sending 12 bytes of data, how long does it take to send over this information?

            BitsToSend = bytes * 8

                   = 12 * 8

                   = 98 bits

            TimeToSend = Data(bits) / Speed(bps)

                   = 98/4800

                   = **0.0204167 Seconds** (rounded to 7 places)

    c) What is a simple strategy to test this program to make sure it is working as given in the requirements?

            Simply open the Serial Data Monitor and repeatedly cover and uncover the sensor and watch to see if the output matches what is expected

d) Take a screenshot of your Serial Monitor displaying motion data logs. Add the image here.
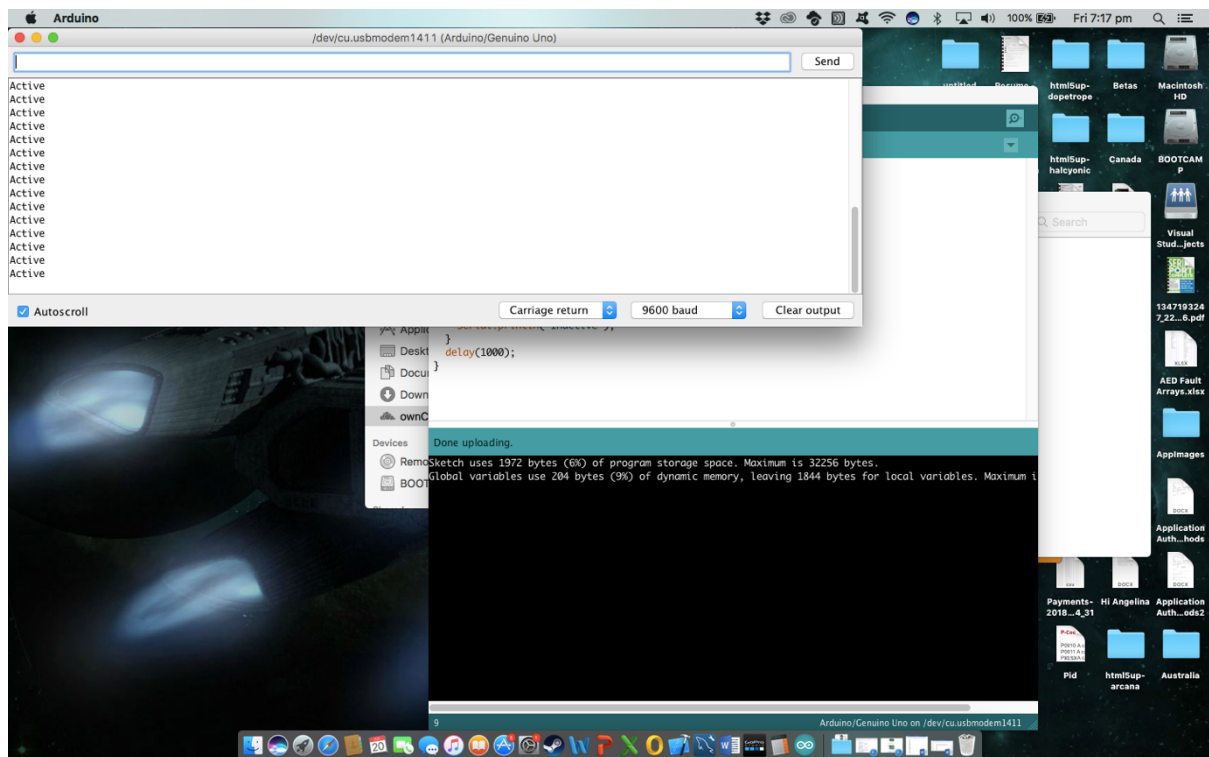
e) Run your program for three minutes. In that time, make sure the sensor can detect 'Active' as well as 'Inactive' data by creating some movement for it to detect. Retrieve the collected data as text file and save it your computer's hard drive, naming it 'lab2_motionData.txt'. Upload 'lab2_motionData.txt' with this lab report.

Question 3
Temperature and Humidity Sensor
   a) Please refer to the provided '**Sensing Temperature and Humidity Activity Sheet**' and follow the steps. Consider the given code in the activity sheet and fill the table below. The first row is completed for you.

term	explanation	example usage from code
variable	A variable is a place to store a piece of data. It has a name, a value, and a type.	float temp;
library	A collection of code/files needed to execute the sketch or communicate with a device	#include <DHT.h>
comment	Notes/explanation of code	//Read data and store it to variables hum and temp

b) A spec of the DHT22 sensor is given in the link below. It mentions that the sampling rate is 0.5 Hz.
https://tronixlabs.com.au/sensors/humidity/dht22-temperature-and-humidity-sensor-australia/

     i)   What does the sampling rate mean?

               In this case the sampling rate is the rate at which the sensor can take readings from the environment

     ii)   Where is this used in the Arduino code?

               In the code that I have, it is not used. However, I would assume that it is would be used in the definition/library file for the sensor

c) What is a simple strategy to test this program to make sure it is working as given in the requirements?

               Open the Serial Data Monitor and watch the output while increasing the temperature of the sensor for example by holding in your hands and then placing it on the desk and watch the temperature and humidity change due to body temperature and moisture

d) Take a screenshot of your Serial Monitor displaying temperature & humidity sensor data logs. Add the image here.
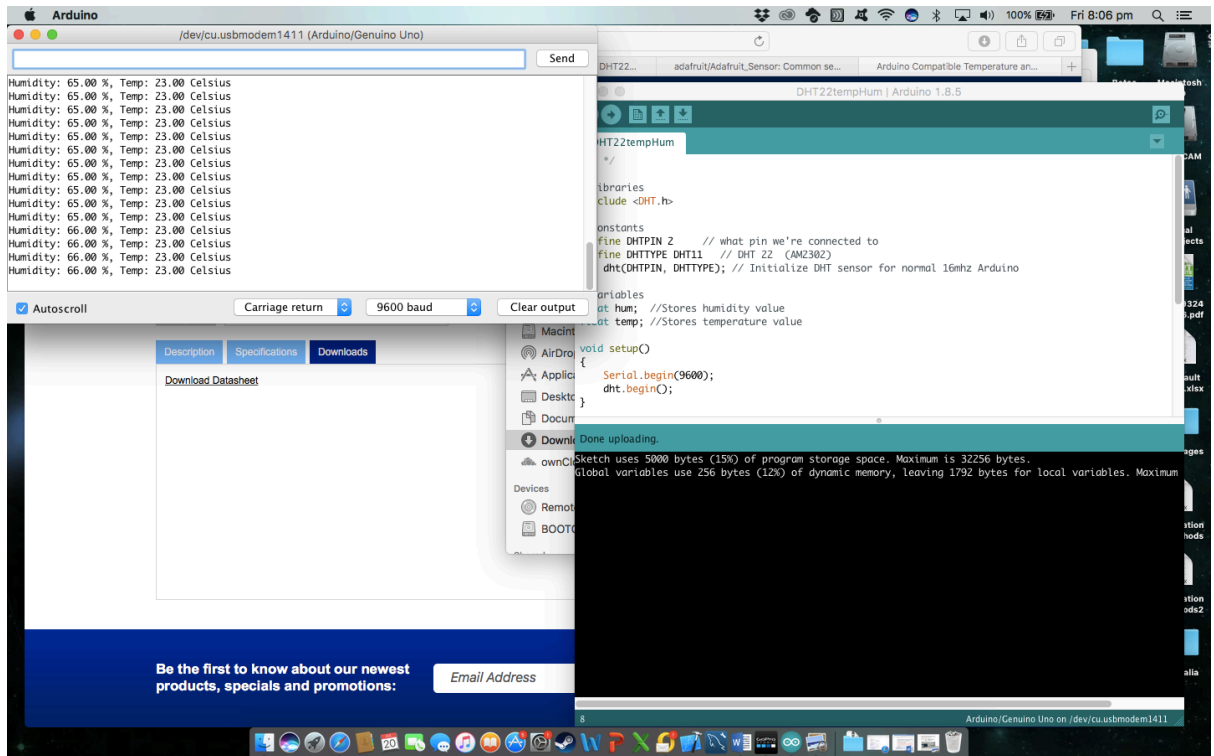
e) Run your program for five minutes. Retrieve the collected data as text file and save it your computer's hard drive, naming it 'lab2_temperatureData.txt'. Upload 'lab2_temperatureData.txt' with this lab report.

Question 4

Soil Moisture Sensor

Please refer to the provided '**Sensing Soil Moisture Activity Sheet**' and follow the steps.

  a) Refer to the given code in DFRobotSoilMoisture.ino. What does the following line do?

```
val = analogRead(0);
```

> val = analogRead(0); sets the value of the variable
> "val" to the value of analogue pin 0

  b) How is `analogRead` different than `digitalRead`?

digitalRead will read either HIGH, LOW on a specified digital pin, whereas analogRead is capable of reading an analogue signal with values between 0 and 1023, this is more useful for reading when reading for example resistance between probes on the soil moisture sensor

  c) What is a simple strategy to test this program to make sure it is working as given in the requirements?

> Open the Serial Data Monitor and watch the output while testing the probes
> of the senor in say some cloths of different dampness

  d) Take a screenshot of your Serial Monitor displaying soil moisture sensor data logs. Add the image here.
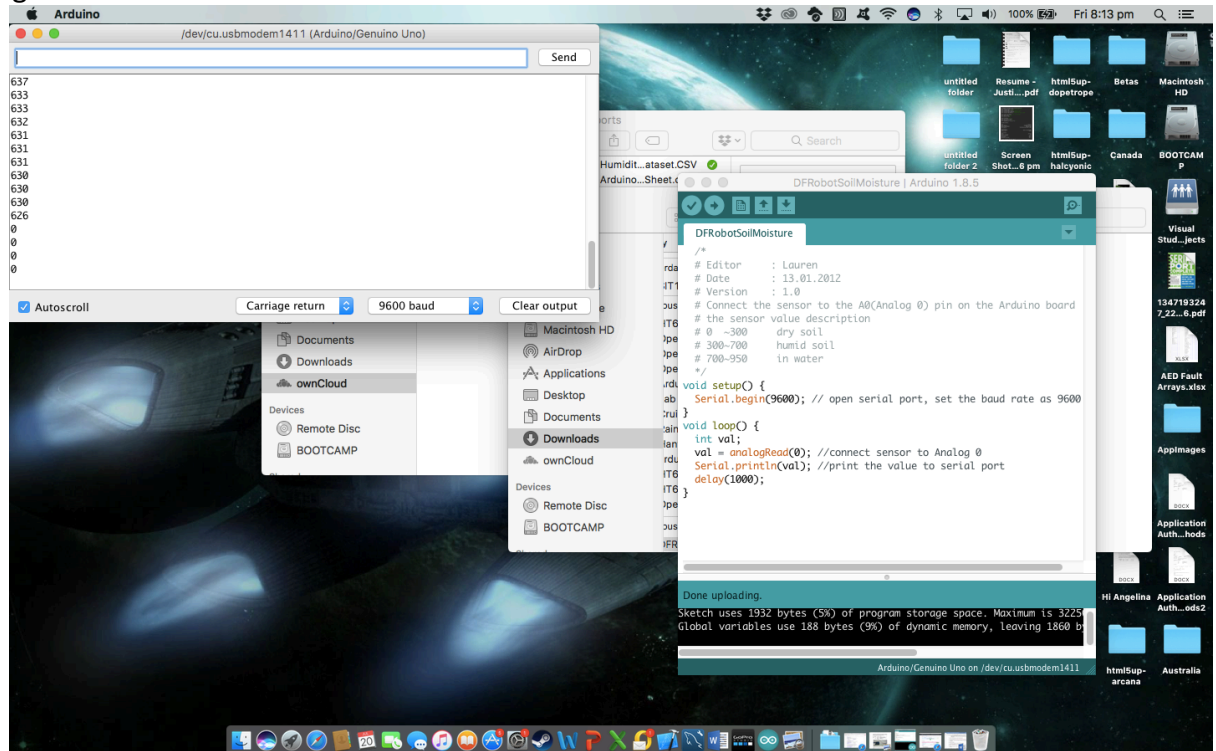
  e) Run your program for three minutes. Experiment testing the sensor in the air, in water & wet tissue. Retrieve the collected data as text file and save it your computer's hard drive, naming it 'lab2_soilMoistureData.txt'. Upload 'lab2_soilMoistureData.txt' with this lab report.