Plotting Arduino Data in IPython Notebook

This IPython notebook produced a continously updating plot of the readings coming in from two analog-in lines on an Arduino.

This notebook was started with...

```
ipython3 notebook --pylab=qt
```

This Notebook is base on modifying code found at the following:

- Display analog data from Arduino using Python (matplotlib) (http://electronut.in/plotting-real-time-data-from-arduino-using-python/)
- Speeding up Matplotlib (http://bastibe.de/posts/Speeding-up-Matplotlib.html)
- See IPython3 modifications below

In [1]:
```
import sys, serial
import numpy as np
from time import sleep
from collections import deque
from matplotlib import pyplot as plt
```

In [2]:
```
# class that holds analog data for N samples
class AnalogData:
  # constr
  def __init__(self, maxLen):
    self.ax = deque([0.0]*maxLen)
    self.ay = deque([0.0]*maxLen)
    self.maxLen = maxLen

  # ring buffer
  def addToBuf(self, buf, val):
    if len(buf) < self.maxLen:
      buf.append(val)
    else:
      buf.pop()
      buf.appendleft(val)

  # add data
  def add(self, data):
    assert(len(data) == 2)
    self.addToBuf(self.ax, data[0])
    self.addToBuf(self.ay, data[1])
```

In [3]:
```
# plot class
class AnalogPlot:
  # constr
  def __init__(self, analogData):
    # set plot to animated
```

```
    self.fig, axplt = plt.subplots() #plt.ion()
    self.axline, = axplt.plot(analogData.ax)
    self.ayline, = axplt.plot(analogData.ay)
    plt.ylim([0, 1023])

  # update plot
  def update(self, analogData):
    self.axline.set_ydata(analogData.ax)
    self.ayline.set_ydata(analogData.ay)
    self.fig.canvas.draw()
    self.fig.canvas.flush_events()
    #plt.draw()
```

In [4]:

```
# main() function
def main(dev):

    strPort = dev

    # plot parameters
    analogData = AnalogData(100)
    analogPlot = AnalogPlot(analogData)
    print('plotting data...')

    # open serial port
    ser = serial.Serial(strPort, 9600)

    while True:
        try:
            #.strip(b'\x00').decode('ascii') added for IPython3
            line = ser.readline().strip(b'\x00').decode('ascii')
            data = [float(val) for val in line.split()]
            if(len(data) == 2):
                analogData.add(data)
                analogPlot.update(analogData)
        except: #Interrupt the kernal to exit
            print('Exiting')
            break

    # close serial
    ser.flush()
    ser.close()
```

In [5]:

```
#Execute prior to plugging in the arduino
pre_list = !ls /dev/tty*
```

In [6]:

```
#Execute after plugging in the arduino
post_list = !ls /dev/tty*
for tty_dev in post_list:
    if tty_dev not in pre_list:
        print("Your device id is {}".format(tty_dev))
        dev = tty_dev
```

```
Your device id is /dev/ttyUSB0
```

In [7]:

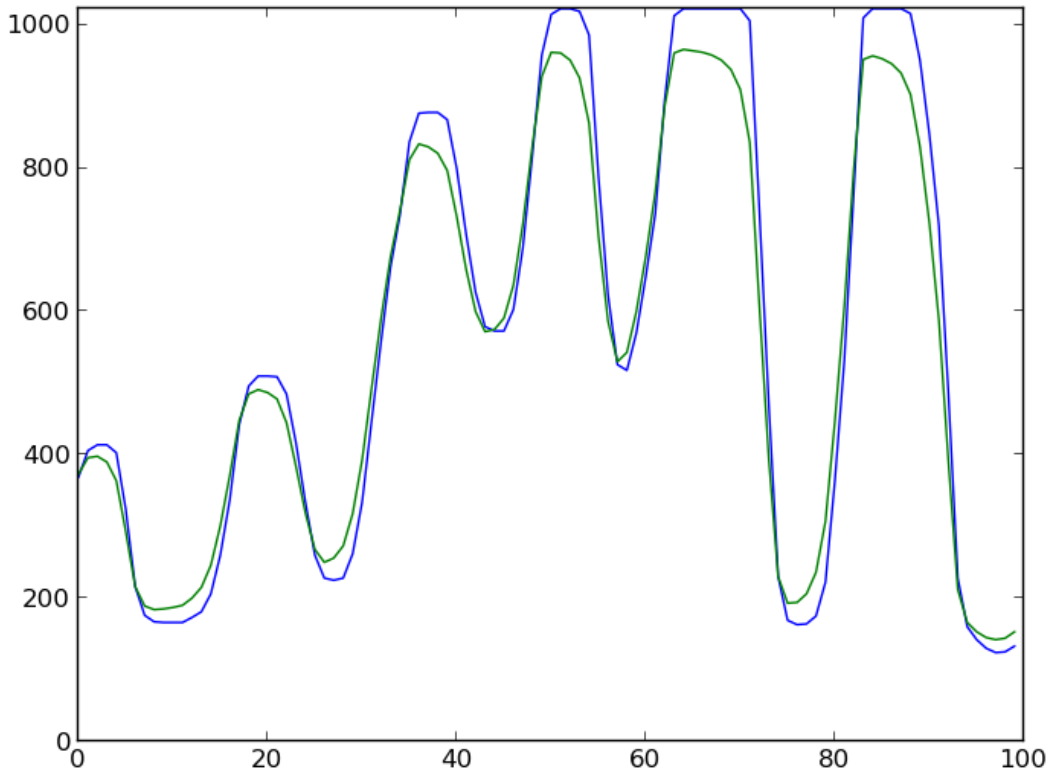
```
main(dev)
```

```
plotting data...
Exiting
```

In [8]:

```
from IPython.display import Image
PWD = !pwd
Image(filename=PWD[0]+'/figure_2.png')
#Image of plot output with 1 variable resister connected and the other
line floating
```

Out[8]:



Changes made due to the differences between IPython3 and IPython

The serial data collection was modified to run in IPython3 with the addition of

```
#.strip(b'\x00').decode('ascii') added to...
line = ser.readline().strip(b'\x00').decode('ascii')
#in main()
```

to deal with the differences between python3-serial and python-serial

Arduino Code

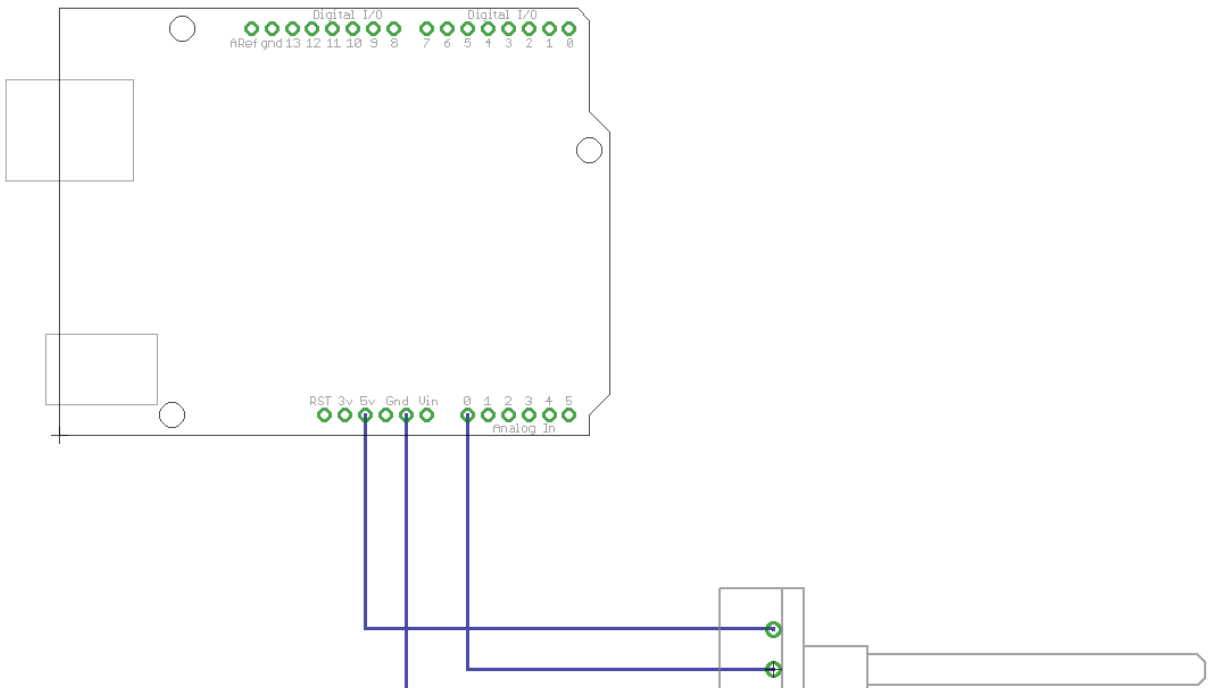
This code was copied from Plotting real-time data from Arduino using Python (http://electronut.in/plotting-real-time-data-from-arduino-using-python/)

```
// analog-plot
//
// Read analog values from A0 and A1 and print them to serial po
rt.
//
// electronut.in

#include "Arduino.h"

void setup()
{
  // initialize serial comms
  Serial.begin(9600);
}

void loop()
{
  // read A0
  int val1 = analogRead(0);
  // read A1
  int val2 = analogRead(1);
  // print to serial
  Serial.print(val1);
  Serial.print(" ");
  Serial.print(val2);
  Serial.print("\n");
  // wait
  delay(50);
}
```

Hookup

In [11]:
```
Image(filename=PWD[0]+'/Arduino_image.png')
```

Out[11]:



In [ ]: