

```
import serial
import time
import threading
import numpy as np
import matplotlib.pyplot as plt

ser = serial.Serial('COM3', 9600)

data_front = []
sampling_time = 4
```

1.

```
def get_data():
    global timer
    ser.write('A'.encode())
    value = ser.readline().decode('utf-8')
    data_front.append(float(value))
    timer = threading.Timer(0.001, get_data)
    timer.start()
```

```
while True:
    new_data = data_front[len(data_front):len(data_front)+1]
    timer = threading.Timer(0.001, get_data)
    timer.start()
    time.sleep(sampling_time)
    timer.cancel()

    plt.subplot(2,1,1)
    Fs = len(data_front)
    t = np.arange(0,1,1/Fs)
    plt.plot(t,data_front,'b-')
    plt.subplot(2,1,2)
    frq = np.arange(0,Fs/2)
    freq = frq[range(int(Fs/2))]

    Y = np.fft.fft(new_data)/Fs
    Y = Y[range(int(Fs/2))]

    plt.plot(freq,abs(Y),'r-')
    plt.pause(0.0001)
    new_data = []
```

```
if ser.isOpen():  
    ser.close()
```

```
void setup() {  
    // put your setup code here, to run once:  
    Serial.begin(9600);  
    pinMode(A0, INPUT);  
}  
  
void loop() {  
    // put your main code here, to run repeatedly:  
    int sensorValue = analogRead(A0);  
    if (Serial.available() > 0){  
        if (Serial.read()=='A') {  
            Serial.println(sensorValue);  
        }  
    }  
    delay(1);  
}
```

Youtube_link: <https://youtu.be/oK8vhkFMtIM>