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In [2]: import numpy as np
        from matplotlib import pyplot as plt
        from scipy import signal as sgn
```

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In [29]: from raspi_import import raspi_import

sample_period, data = raspi_import("./out/adcdData_1.bin")

n_start = 5000
n_stop = 45000

def prepros (data, maximum = 4096):
    d = data / maximum
    #d = d - 0.5
    d = d - np.mean(d)
    return d

plt.plot(data[:,3])
plt.show()

q = prepros(data[n_start:n_stop,3])

i = prepros(data[n_start:n_stop,4])

plt.plot(i)
plt.show()

fft = (np.abs(np.fft.fft(q)))
print(sample_period)
plt.plot(np.fft.fftshift(np.fft.fftfreq(len(fft),sample_period/(1e6))),np.fft.fftshift(fft))
plt.show()
plt.plot(fft)
plt.show()
fft_i = np.abs(np.fft.fft(i)[:len(fft)//2])
fft_q = np.abs(np.fft.fft(q))

#cross = sgn.correlate(fft_i,fft_q)
#plt.plot( cross)
#plt.show()

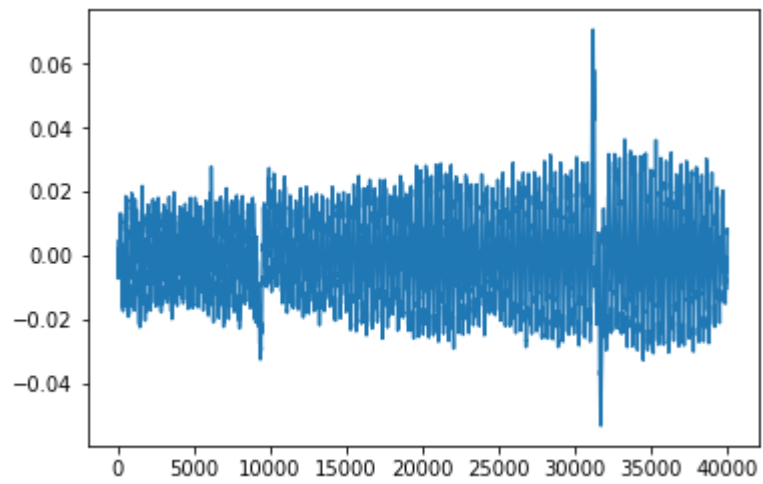
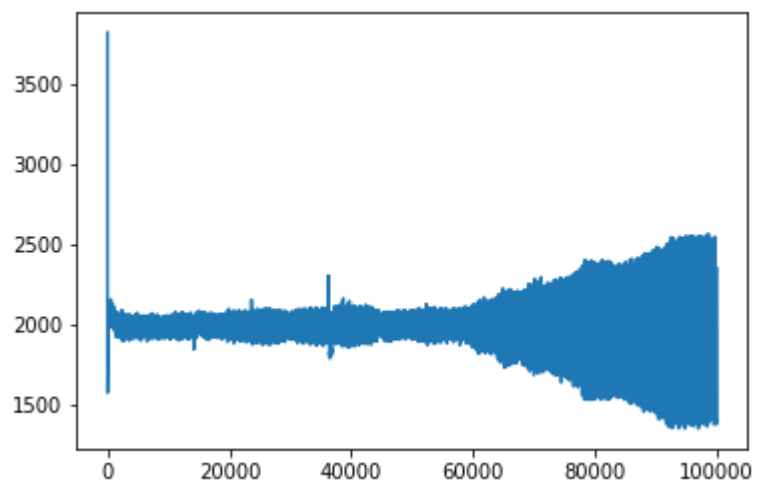
m = np.amax(fft_i)
i = np.where(fft_i == m)[0][0]
print(i)

fn = ((i / (len(fft)))) * 31250

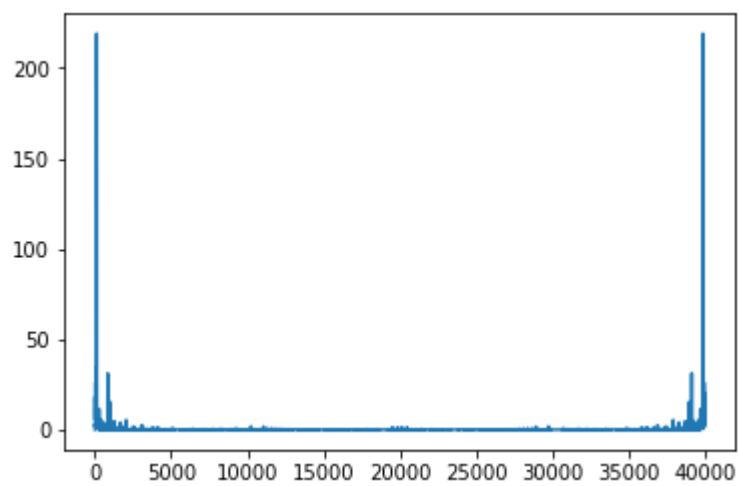
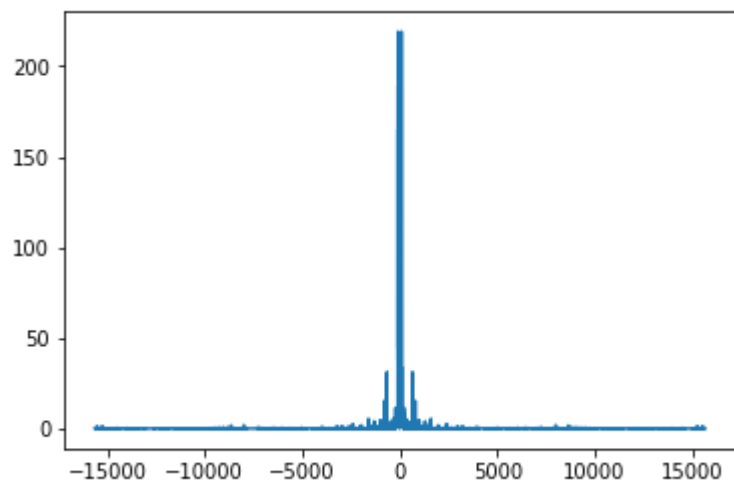
print(fn )
f_0 = 24.13e9
c = 3e8
v = ( c*(fn) )/ (2*(f_0))

print(v, v*3.6)

```



32.0



115
89.84375
0.558498238707 2.01059365935

```
In [74]: def findVelocity(data, start, stop):
          q = prepros(data[start:stop,3])

          i = prepros(data[start:stop,4])

          fft_i = np.abs(np.fft.fft(i)[:len(i)//2])
          fft_q = np.abs(np.fft.fft(q)[:len(i)//2])

          direction = 1 if ( np.mean(np.arctan2(fft_q, fft_i)) > 0 ) else -1

          m = np.amax(fft_i)
          i = np.where(fft_i == m)[0][0]

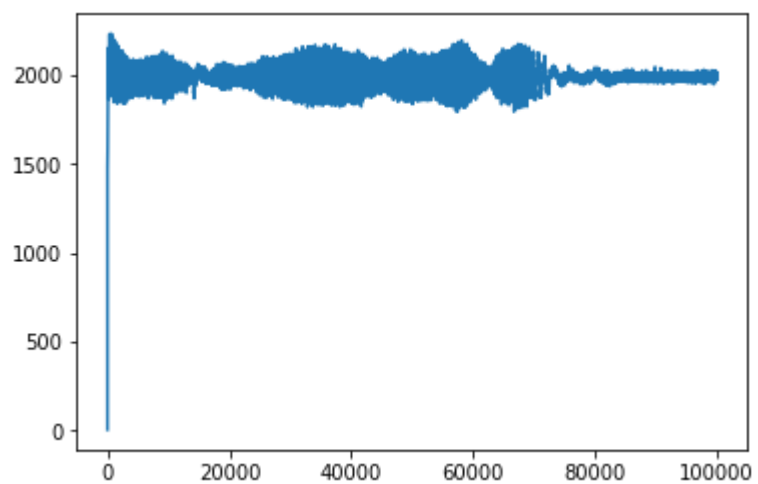
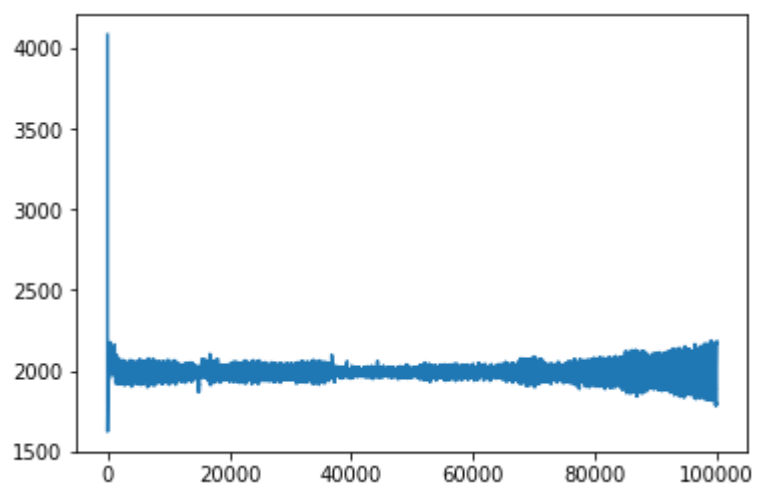
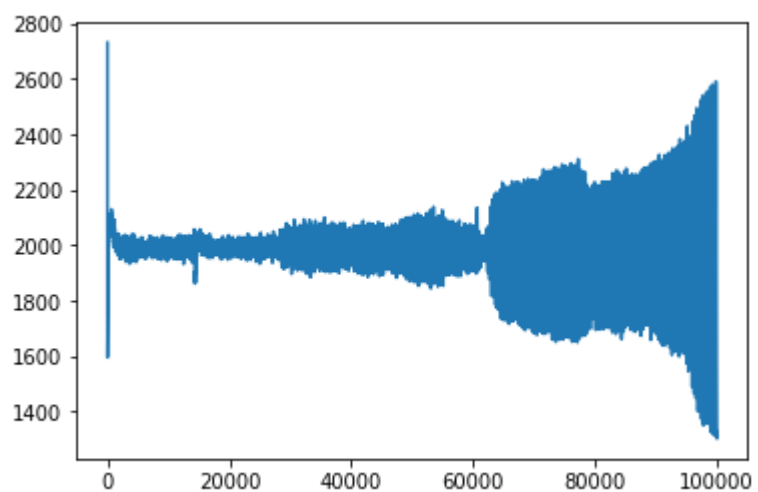
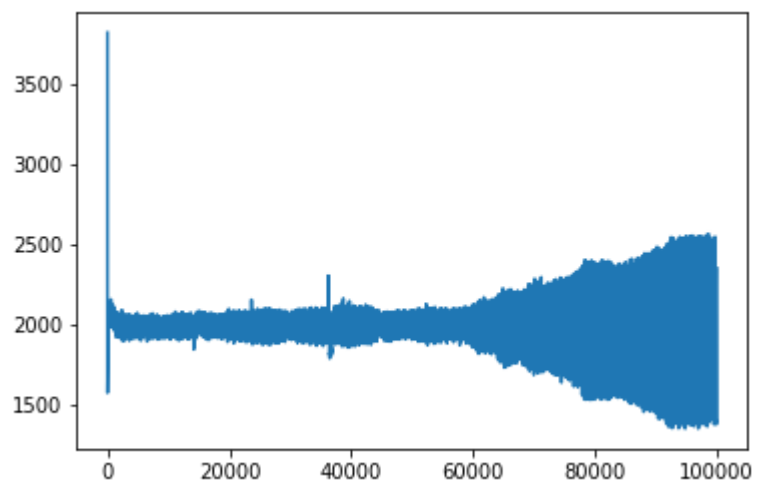
          fn = ((i / (len(fft)))) * 31250

          f_0 = 24.13e9
          c = 3e8
          v = ( c*(fn) )/ (2*(f_0))
          return direction*v
```

```
In [73]: sample_period, data1 = raspi_import("./out/adcdData_1.bin")
sample_period, data2 = raspi_import("./out/adcdData_2.bin")
sample_period, data3 = raspi_import("./out/adcdData_3.bin")
sample_period, data4 = raspi_import("./out/adcdData_4.bin")

plt.plot(data1[:,3])
plt.show()
plt.plot(data2[:,3])
plt.show()
plt.plot(data3[:,3])
plt.show()
plt.plot(data4[:,3])
plt.show()
start = 4000
v1 = findVelocity(data1, 20000, 60000)
v2 = findVelocity(data2, 20000,60000)
v3 = findVelocity(data3, 40000,80000)
v4 = findVelocity(data4, 10000,60000)

print(v1)
print(v2)
print(v3)
print(v4)
```



0.563354745131
0.621632822213
0.587637277248
1.04900538748

