accelerometre_gyroscope

July 1, 2020

[42]:
```
import pandas as pd
data = pd.read_csv("log_event.csv", delimiter=";")
data.head()
```

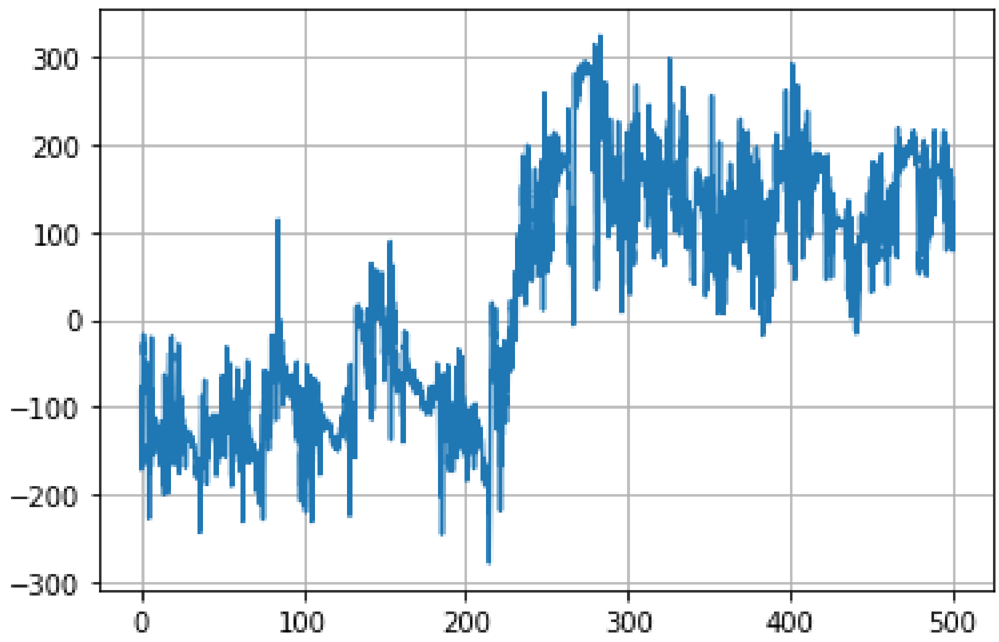
[42]:
```
           heure  event  SM  AvAr  choc      detection_0_text  coef  \
0  13:43:15.652      0   4     0    25  NOT_braquage_EnCours    64
1  13:43:15.751      0  -7    -9    -1                   NaN     0
2  13:43:15.866      0  -7    -9    -1                   NaN     3
3  13:43:16.003      0  -7    -9    -1                   NaN     8
4  13:43:16.092      0  -7    -9    -1                   NaN    16

   Unnamed: 7  Vbatt  Iuser_int  ...  T roll  T pitch  T kest X  T kest Y  \
0         NaN   1502       2487  ...    -8.0     -7.0   -1140.0   -1267.0
1         NaN   1502       2487  ...    -8.0     -7.0   -1293.0   -1414.0
2         NaN   1502       2487  ...    -8.0     -7.0   -1311.0   -1388.0
3         NaN   1502       2487  ...    -7.0    -10.0   -1831.0   -1176.0
4         NaN   1502       2487  ...    -5.0    -12.0   -2019.0    -945.0

   T kest Z  T rp_risk1  T rp_risk2  Unnamed: 191  Unnamed: 192  1714
0    9854.0        49.0        28.0           NaN           NaN   0.0
1    9815.0        48.0        35.0           NaN           NaN   1.0
2    9816.0        49.0        35.0           NaN           NaN   2.0
3    9760.0        44.0        44.0           NaN           NaN   3.0
4    9748.0        50.0        46.0           NaN           NaN   4.0

[5 rows x 194 columns]
```

[44]:
```
data = data[['event','TAx', 'TAy', 'TAz', 'TGx', 'TGy', 'TGz', 'Iuser_int']]
data=(data-data.mean())/data.std()
```

[35]:
```
data.head()
taille = len(data)
```

[189]:
```
import numpy as np
t = np.linspace(0,500, taille)
plt.grid()
plt.plot(t, data.iloc[:,2])
```

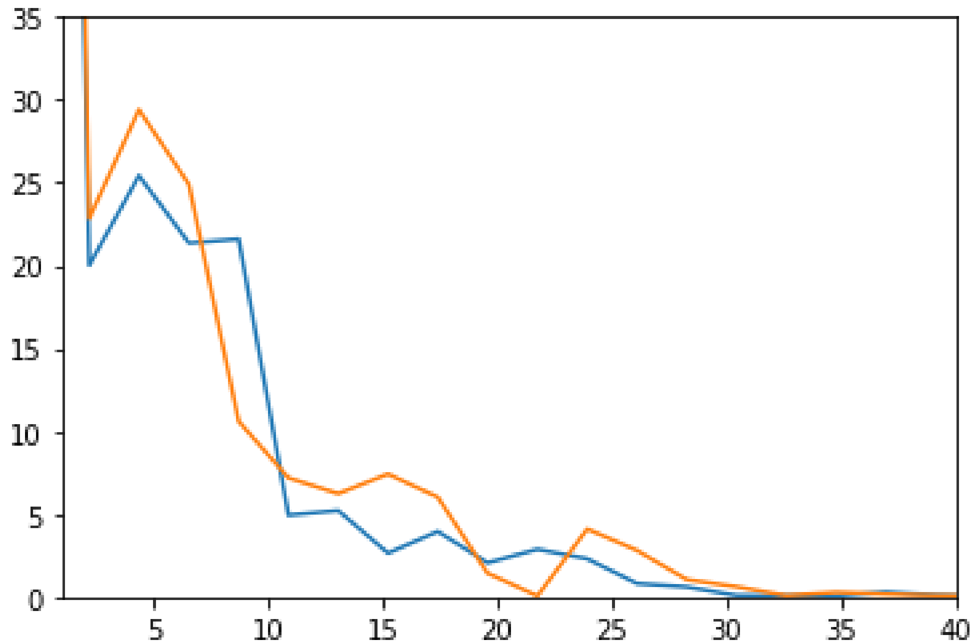
[189]:
```
[<matplotlib.lines.Line2D at 0x7f8ed350a198>]
```



[219]:
```
from scipy.fft import fft
from scipy.signal.windows import hann
from scipy.signal import convolve
from scipy.fftpack import fftfreq

window = hann(7)
def tracerFFT(i):
    y = np.abs(data.iloc[:,i].dropna())
    y = convolve(window, y)
    y = fft(y)
    N = taille
    fs = 10
    T = 1/fs
    xf = np.linspace(0.0, 10000, N//2)
    plt.xlim([1,1000])
    plt.ylim([0,10000])
    plt.plot(xf,np.abs(y[0:N//2]))
    return None

def tracerFFTData(data, taille):
    signal = convolve(window, np.abs(data))
    N = taille
    fs=100
    Ts = 1.0/fs # sampling interval in time
    t = np.arange(0, taille, Ts) # time vector as scipy arange field / numpy.
 ↪ndarray
```

```
    FFT = abs(scipy.fft.fft(signal))
    FFT_side = FFT[range(int(N/2))] # one side FFT range
    freqs = fftfreq(signal.size, t[1]-t[0]) #t[1] - t[0], sample spacing
    freqs_side = freqs[range(int(N/2))] # one side frequency range
    #fig, ax = plt.subplots()
    plt.xlim([1,40])
    plt.ylim([0,35])
    plt.plot(freqs_side, FFT_side)

    return None
```

[221]:
```
tracerFFTData(data.iloc[:,1][0:40], 40)
tracerFFTData(data.iloc[:,1][120:160], 40)
```

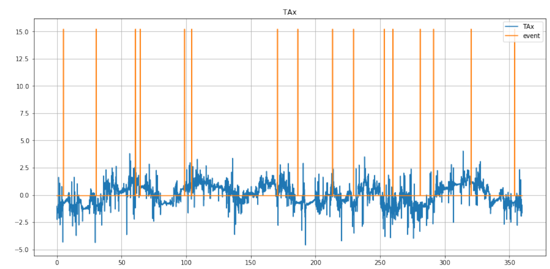


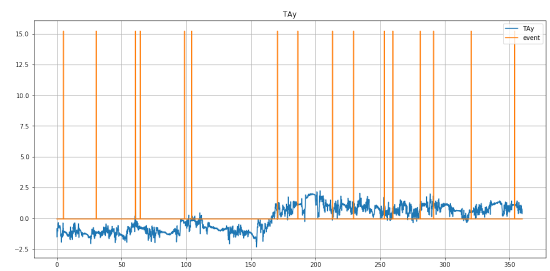
[183]:
```
import time as t
def tracerFFTEvent():
    for i,j in data.iterrows():
        if j['event'] == 130:
            tracerFFTData(data['event'][i-30:i+30])
```

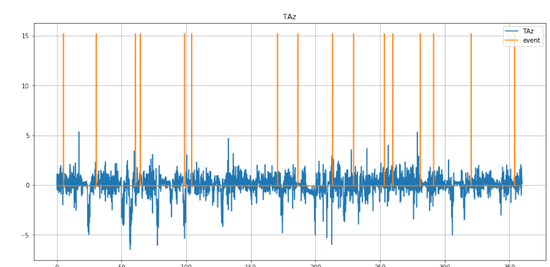
[48]:
```
%matplotlib inline
import numpy as np
import matplotlib.pyplot as plt
fig, ax = plt.subplots(6, figsize=(15,50))
fig.suptitle("Accélérations et vitesses angulaires suivant les trois axes en␣
 ↪fonction du temps en seconde")
for i in range(6):
```

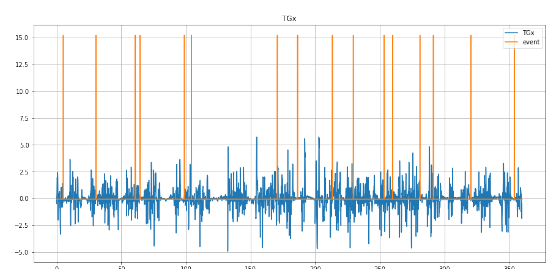
```
    ax[i].grid()
    ax[i].title.set_text((data.columns)[i+1])
    ax[i].plot(np.linspace(0,360,3721), data.iloc[:,i+1], label=data.
↪columns[i+1])
    ax[i].plot(np.linspace(0,360,3721), data.iloc[:,0], label=data.columns[0])
    ax[i].legend(loc='upper right')
```

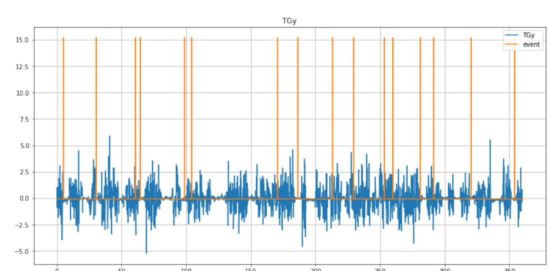
Accélérations et vitesses angulaires suivant les trois axes en fonction du temps en seconde

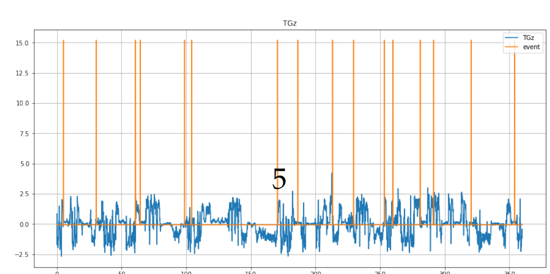












L'accélération selon l'axe x semble la plus pertinente. Celle selon y est compliquée à analyser d'autant plus que comme les essais ont été réalisés dans un terrain en pente, ca fausse les courbes.

0.1 Plot de l'accélération selon x et du courant consommé en fonction du temps

[51]:
```
fig, ax = plt.subplots(1, figsize=(15,10))
ax.plot(np.linspace(0,360,3721), data.iloc[:,0], label=data.columns[0])
ax.plot(np.linspace(0,360,3721), data.iloc[:,1],label=data.columns[1])
ax.plot(np.linspace(0,360,3721), data.iloc[:,-1], label=data.columns[-1])
ax.legend(loc='upper right')
```

[51]:
```
<matplotlib.legend.Legend at 0x7fc207446518>
```