

soc_dst

April 19, 2018

```
In [108]: %matplotlib inline
import matplotlib.pyplot as plt
import pandas as pd

file = r'../data/DST/SP2_OC_DST/02_24_2016_SP20-2_OC_DST_80SOC.xls'
xls = pd.ExcelFile(file)
df = pd.read_excel(xls, 'Channel_1-006')

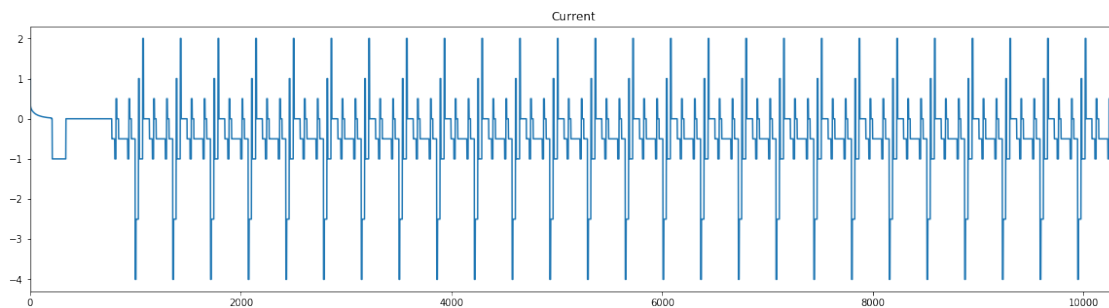
# df = pd.read_excel(open(file, 'rb'), sheet_name='Channel_1-006')

# get column names
# print(list(df))

#
```

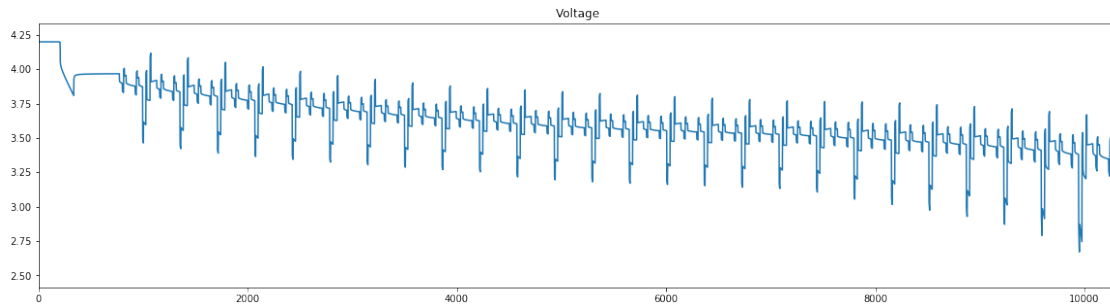
```
In [109]: df['Current(A)'].plot(title='Current', figsize=(20, 5))
```

```
Out[109]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e10d3e10>
```



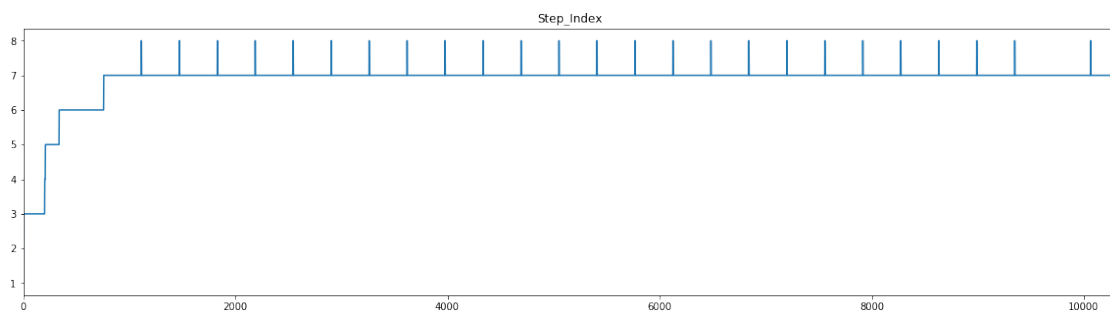
```
In [110]: df['Voltage(V)'].plot(title='Voltage', figsize=(20, 5))
```

```
Out[110]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0e54890>
```



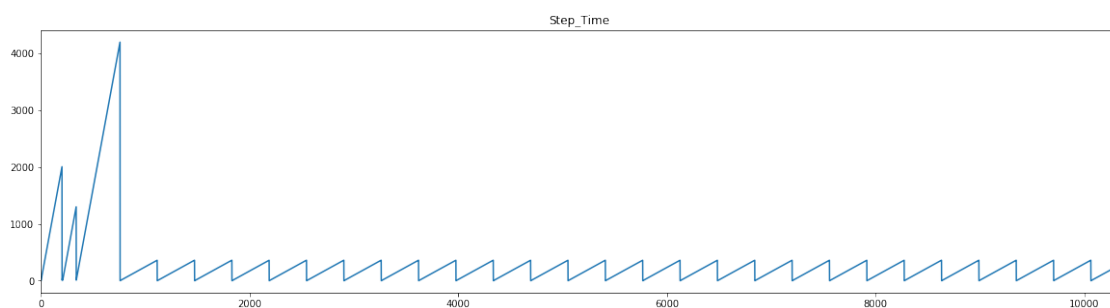
```
In [111]: df['Step_Index'].plot(title='Step_Index' , figsize=(20, 5))
```

```
Out[111]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0e5c810>
```



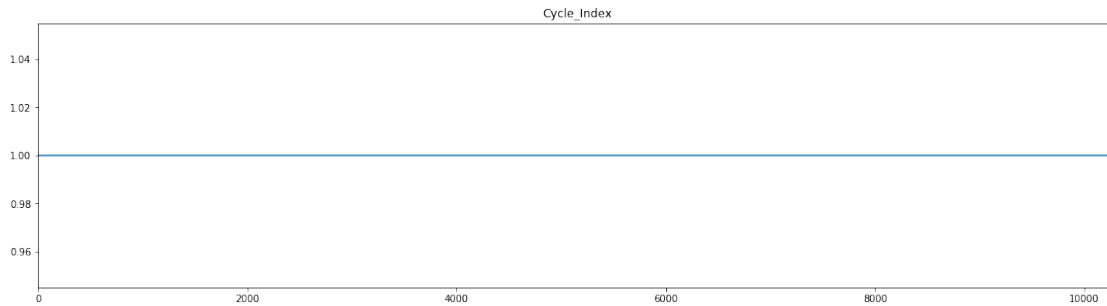
```
In [112]: df['Step_Time(s)'].plot(title='Step_Time' , figsize=(20, 5))
```

```
Out[112]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0f16590>
```



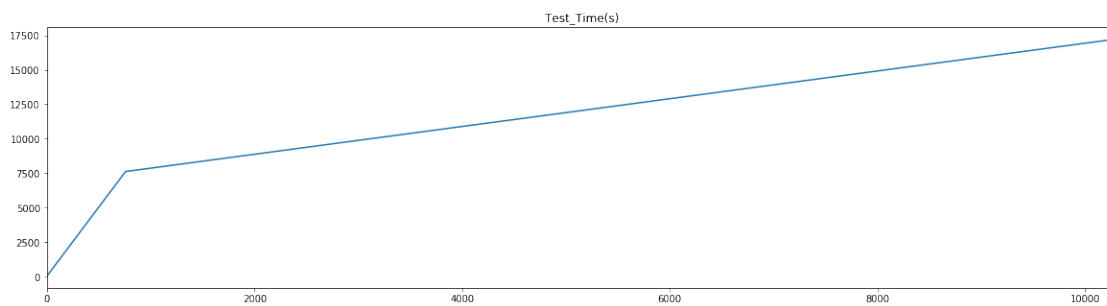
```
In [113]: df['Cycle_Index'].plot(title='Cycle_Index' , figsize=(20, 5))
```

```
Out[113]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0eabc10>
```



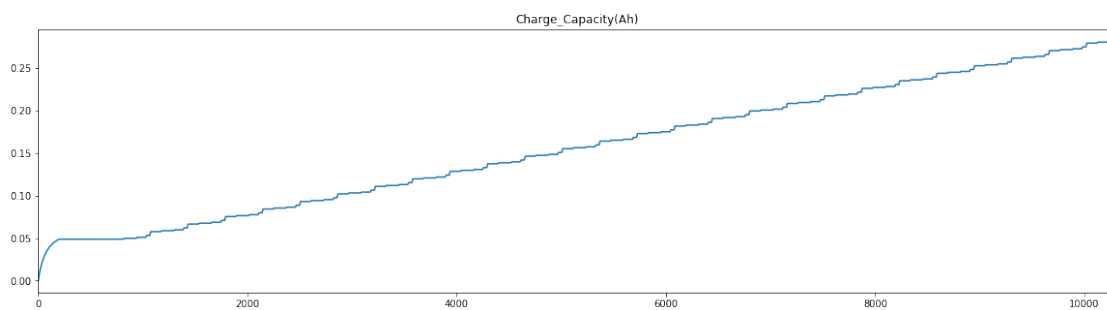
```
In [114]: df['Test_Time(s)'].plot(title='Test_Time(s)' , figsize=(20, 5))
```

```
Out[114]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0d4e3d0>
```



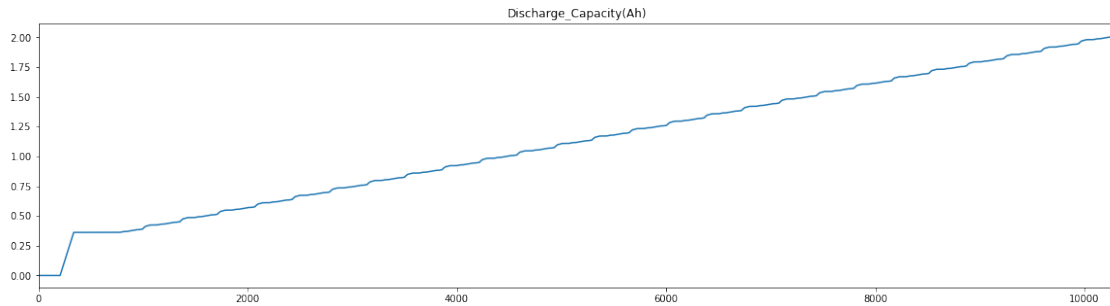
```
In [115]: df['Charge_Capacity(Ah)'].plot(title='Charge_Capacity(Ah)' , figsize=(20, 5))
```

```
Out[115]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0cd3950>
```



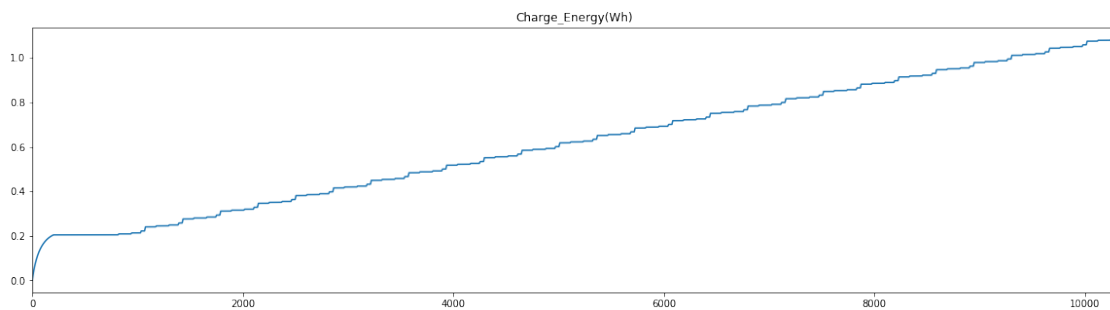
```
In [116]: df['Discharge_Capacity(Ah)'].plot(title='Discharge_Capacity(Ah)' , figsize=(20, 5))
```

```
Out[116]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0c99790>
```



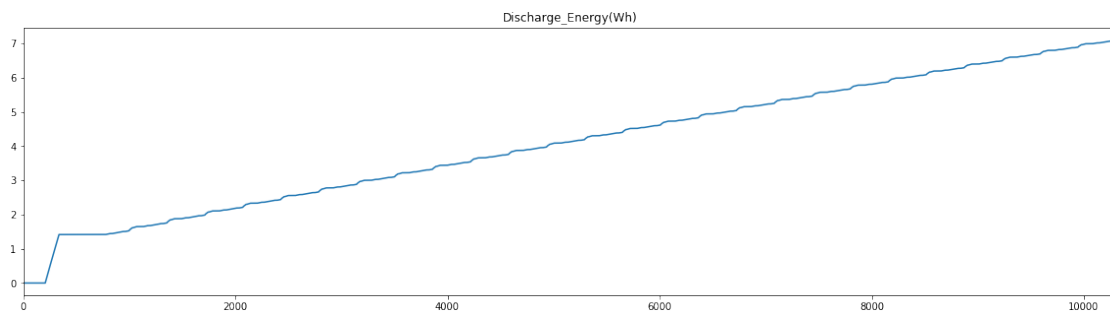
```
In [117]: df['Charge_Energy(Wh)'].plot(title='Charge_Energy(Wh)' , figsize=(20, 5))
```

```
Out[117]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0c07050>
```



```
In [118]: df['Discharge_Energy(Wh)'].plot(title='Discharge_Energy(Wh)' , figsize=(20, 5))
```

```
Out[118]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0b6a890>
```



```
In [119]: current = df['Current(A)']
          voltage = df['Voltage(V)']
```

```

import numpy as np

df_soc = df[['Current(A)', 'Voltage(V)']]

# df_soc['SOC'] = pd.Series([soc_init], index=df.index)
df_soc = df_soc.assign(SOC=pd.Series(np.ones(len(df.index))).values)

df_soc

```

```

Out[119]:

```

	Current(A)	Voltage(V)	SOC
0	0.000000	4.154059	1.0
1	0.999353	4.247043	1.0
2	0.339846	4.199741	1.0
3	0.317353	4.199903	1.0
4	0.300798	4.199903	1.0
5	0.287662	4.199741	1.0
6	0.276505	4.199741	1.0
7	0.267328	4.199741	1.0
8	0.259050	4.199741	1.0
9	0.251852	4.199741	1.0
10	0.245734	4.200065	1.0
11	0.239256	4.199903	1.0
12	0.233677	4.200065	1.0
13	0.228099	4.199579	1.0
14	0.223420	4.199741	1.0
15	0.218562	4.199903	1.0
16	0.214423	4.199903	1.0
17	0.209924	4.199903	1.0
18	0.205786	4.199741	1.0
19	0.201827	4.199741	1.0
20	0.197868	4.199741	1.0
21	0.193909	4.199741	1.0
22	0.190490	4.199741	1.0
23	0.187251	4.199741	1.0
24	0.183832	4.199741	1.0
25	0.180413	4.199741	1.0
26	0.177354	4.199741	1.0
27	0.174115	4.199903	1.0
28	0.171056	4.199903	1.0
29	0.168357	4.199903	1.0
...
10281	-0.500328	3.352525	1.0
10282	-0.500688	3.351715	1.0
10283	-0.500508	3.351067	1.0
10284	-0.500508	3.350581	1.0
10285	-0.500508	3.349771	1.0
10286	-0.500328	3.349285	1.0

10287	-0.500508	3.348799	1.0
10288	-0.500508	3.347989	1.0
10289	-0.500508	3.347503	1.0
10290	-0.500508	3.347179	1.0
10291	-0.500688	3.346531	1.0
10292	-0.500508	3.346045	1.0
10293	-0.500328	3.345721	1.0
10294	-0.500508	3.345235	1.0
10295	-0.500328	3.344749	1.0
10296	-0.500508	3.344263	1.0
10297	-0.500508	3.343777	1.0
10298	-0.500508	3.343292	1.0
10299	-0.500328	3.342805	1.0
10300	-0.500508	3.342481	1.0
10301	-0.500508	3.341995	1.0
10302	-4.000303	2.908506	1.0
10303	-4.000124	2.792844	1.0
10304	-4.000124	2.726589	1.0
10305	-4.000303	2.671350	1.0
10306	-4.000124	2.624859	1.0
10307	-4.000303	2.582255	1.0
10308	-4.000303	2.544349	1.0
10309	-4.000303	2.506929	1.0
10310	-4.000124	2.498991	1.0

[10311 rows x 3 columns]

In [120]: # SOC calculation

```
for i in range(1, len(df_soc)):
    df_soc.loc[i, 'SOC'] = df_soc.loc[i-1, 'SOC'] + df_soc.loc[i-1, 'Current(A)']/7200
```

df_soc

Out[120]:

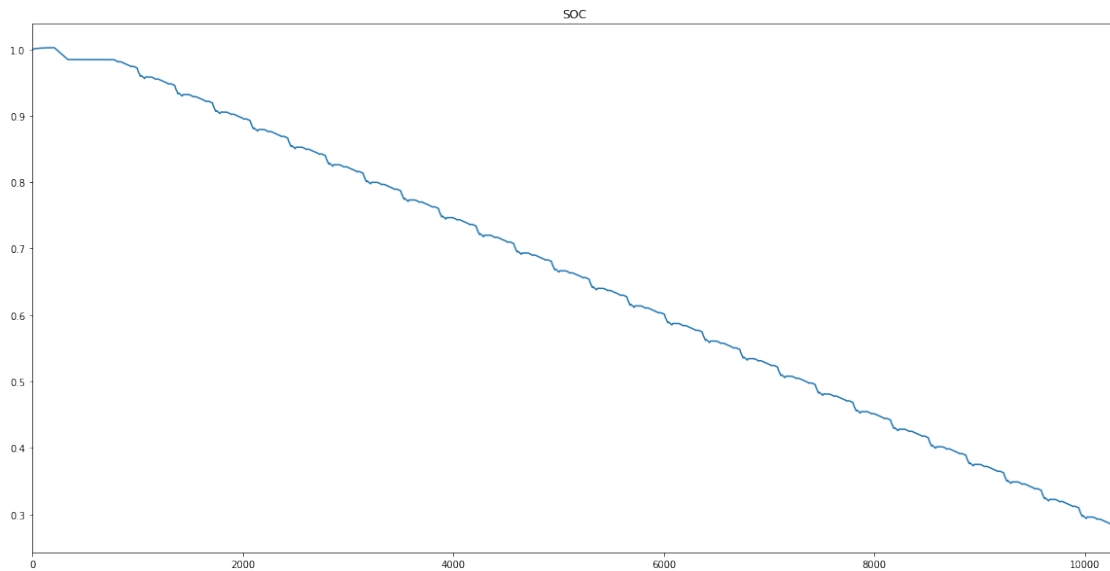
	Current(A)	Voltage(V)	SOC
0	0.000000	4.154059	1.000000
1	0.999353	4.247043	1.000000
2	0.339846	4.199741	1.000139
3	0.317353	4.199903	1.000186
4	0.300798	4.199903	1.000230
5	0.287662	4.199741	1.000272
6	0.276505	4.199741	1.000312
7	0.267328	4.199741	1.000350
8	0.259050	4.199741	1.000387
9	0.251852	4.199741	1.000423
10	0.245734	4.200065	1.000458
11	0.239256	4.199903	1.000492
12	0.233677	4.200065	1.000526
13	0.228099	4.199579	1.000558

14	0.223420	4.199741	1.000590
15	0.218562	4.199903	1.000621
16	0.214423	4.199903	1.000651
17	0.209924	4.199903	1.000681
18	0.205786	4.199741	1.000710
19	0.201827	4.199741	1.000739
20	0.197868	4.199741	1.000767
21	0.193909	4.199741	1.000794
22	0.190490	4.199741	1.000821
23	0.187251	4.199741	1.000848
24	0.183832	4.199741	1.000874
25	0.180413	4.199741	1.000899
26	0.177354	4.199741	1.000924
27	0.174115	4.199903	1.000949
28	0.171056	4.199903	1.000973
29	0.168357	4.199903	1.000997
...
10281	-0.500328	3.352525	0.284599
10282	-0.500688	3.351715	0.284530
10283	-0.500508	3.351067	0.284460
10284	-0.500508	3.350581	0.284391
10285	-0.500508	3.349771	0.284321
10286	-0.500328	3.349285	0.284252
10287	-0.500508	3.348799	0.284182
10288	-0.500508	3.347989	0.284113
10289	-0.500508	3.347503	0.284043
10290	-0.500508	3.347179	0.283974
10291	-0.500688	3.346531	0.283904
10292	-0.500508	3.346045	0.283835
10293	-0.500328	3.345721	0.283765
10294	-0.500508	3.345235	0.283696
10295	-0.500328	3.344749	0.283626
10296	-0.500508	3.344263	0.283557
10297	-0.500508	3.343777	0.283487
10298	-0.500508	3.343292	0.283418
10299	-0.500328	3.342805	0.283348
10300	-0.500508	3.342481	0.283279
10301	-0.500508	3.341995	0.283209
10302	-4.000303	2.908506	0.283139
10303	-4.000124	2.792844	0.282584
10304	-4.000124	2.726589	0.282028
10305	-4.000303	2.671350	0.281473
10306	-4.000124	2.624859	0.280917
10307	-4.000303	2.582255	0.280362
10308	-4.000303	2.544349	0.279806
10309	-4.000303	2.506929	0.279250
10310	-4.000124	2.498991	0.278695

```
[10311 rows x 3 columns]
```

```
In [121]: df_soc['SOC'].plot(title='SOC' , figsize=(20, 10))
```

```
Out[121]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0c6f4d0>
```



```
In [122]: df_soc.plot(title='Current and Voltage' , figsize=(20, 20))
```

```
Out[122]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa3e0a15b10>
```