

Timing and Frequency Script

Includes Count, Mean, and Standard Deviation

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twang626@bird: ~/Desktop (ssh) #1 ..OpenPLC/10_25 (-zsh) #2 ~/Desktop (-zsh) #3 +
twang626@bird:~/Desktop/10_25$ python3 timing_and_frequency_analysis.py
Write_to_Write_Timing:
    Count: 181 in total
    Mean: 6546.36 milliseconds
    Standard Deviation: 5718.26 milliseconds
Read_to_Write_Timing:
    Count: 137 in total
    Mean: 96.47 milliseconds
    Standard Deviation: 52.61 milliseconds
Read_to_Read_Timing:
    Count: 484 in total
    Mean: 2489.27 milliseconds
    Standard Deviation: 2623.95 milliseconds

Cycle Frequencies (Use a WRITE TO WRITE as a cycle)
    Cycle Count: 181 in total
    Frequency Sequences: [(0.33333333, 0.00018292), (0.5, 0.00106101), (0.5, 0.00091283), (1.0, 0.003861), (0.25, 0.00057225), (0.5, 0.0010015), (1.0, 0.00900901), (0.5, 0.00066511), (0.25, 0.000594), (0.5, 0.00105042), (1.0, 0.00888889), (0.5, 0.00143988), (0.22222222, 0.00043526), (0.5, 0.00119546), (1.0, 0.00913242), (0.5, 0.00123153), (0.28571429, 0.00035193), (0.28571429, 0.00050929), (0.25, 0.00052043), (0.5, 0.00147493), (1.0, 0.00900901), (0.5, 0.0010352), (0.25, 0.00045455), (0.5, 0.00126662), (1.0, 0.00913242), (0.5, 0.00116959), (0.25, 0.00043262), (0.5, 0.0014771), (1.0, 0.00892857), (0.5, 0.00073502), (0.25, 0.00052757), (0.5, 0.00137836), (1.0, 0.00913242), (0.5, 0.00108932), (0.25, 0.00042836), (0.5, 0.00111421), (1.0, 0.00763359), (0.5, 0.00137836), (0.25, 0.00045455), (0.5, 0.0008726), (1.0, 0.00854701), (0.5, 0.00073341), (0.22222222, 0.00062657), (0.5, 0.00111111), (1.0, 0.00754717), (0.5, 0.00130124), (0.25, 0.00045444), (0.5, 0.00098961), (1.0, 0.00763359), (0.5, 0.0015186), (0.25, 0.00043262), (0.5, 0.00111297), (1.0, 0.00763359), (0.5, 0.00137646), (0.25, 0.00045455), (0.5, 0.00099108), (1.0, 0.00763359), (0.5, 0.00162999), (0.25, 0.00043234), (0.5, 0.00111297), (1.0, 0.00896861), (0.5, 0.00134409), (0.25, 0.00045444), (0.5, 0.00096899), (1.0, 0.00913242), (0.5, 0.00157604), (0.28571429, 0.00038767), (0.5, 0.00111049), (1.0, 0.00888889), (0.5, 0.00134228), (0.25, 0.00045455), (0.5, 0.00099108), (1.0, 0.00714286), (0.22222222, 0.00032733), (1.0, 0.00909091), (0.5, 0.00108814), (0.2, 0.00037195), (0.5, 0.00099108), (1.0, 0.00766284), (0.5, 0.00163132), (0.25, 0.00049838), (0.5, 0.00081666), (1.0, 0.00772201), (0.5, 0.00099108), (0.25, 0.00045475), (0.5, 0.00137931), (1.0, 0.00769231), (0.5, 0.00111483), (0.25, 0.00043281), (0.5, 0.00162602), (1.0, 0.00769231), (0.5, 0.00099157), (0.22222222, 0.00045321), (0.5, 0.00137646), (1.0, 0.0077821), (0.5, 0.00111421), (0.25, 0.00043281), (0.5, 0.00162866), (1.0, 0.00772201), (0.5, 0.00099108), (0.25, 0.00045475), (0.5, 0.00156986), (1.0, 0.00769231), (0.5, 0.00099108), (0.25, 0.00032733), (1.0, 0.00909091), (0.5, 0.00108814), (0.2, 0.00037195), (0.5, 0.00099108), (1.0, 0.00766284), (0.5, 0.00163132), (0.25, 0.00049838), (0.5, 0.00081666), (1.0, 0.00772201), (0.5, 0.00099108), (0.25, 0.00045475), (0.5, 0.00137931), (1.0, 0.00769231), (0.5, 0.00111483), (0.25, 0.00043281), (0.5, 0.00162602), (1.0, 0.00769231), (0.5, 0.00099157), (0.22222222, 0.00045321), (0.5, 0.00137646), (1.0, 0.0077821), (0.5, 0.00111421), (0.25, 0.00043281), (0.5, 0.00162866), (1.0, 0.00772201), (0.5, 0.00099108), (0.25, 0.00045475), (0.5, 0.00132363), (1.0, 0.00766284), (0.5, 0.00111359), (0.22222222, 0.00050188), (0.5, 0.00162866), (1.0, 0.00873362), (0.5, 0.0007391), (0.25, 0.00053419), (0.5, 0.00137836), (1.0, 0.00760456), (0.5, 0.00081733), (0.22222222, 0.00050761), (0.5, 0.00156986), (1.0, 0.00769231), (0.5, 0.00074878), (0.25, 0.00053419), (0.5, 0.00137836), (1.0, 0.00769231), (0.5, 0.00081733), (0.25, 0.00049875), (0.2, 0.00026842), (0.25, 0.00043281), (0.5, 0.00162866), (1.0, 0.00769231), (0.5, 0.00099256), (0.25, 0.00045475), (0.5, 0.00138026), (1.0, 0.00757576), (0.5, 0.00111359), (0.25, 0.00043262), (0.5, 0.00162866), (1.0, 0.00769231), (0.5, 0.00099059), (0.25, 0.00053362), (0.5, 0.00081666), (1.0, 0.00769231), (0.5, 0.00136986), (0.25, 0.00053447), (0.5, 0.00074794), (1.0, 0.00766284), (0.5, 0.00163399), (0.25, 0.00043262), (0.5, 0.00111545), (1.0, 0.00760456), (0.5, 0.00137836), (0.25, 0.00045496), (0.5, 0.0009828), (1.0, 0.00938967), (0.5, 0.00158856), (0.22222222, 0.00043526), (0.5, 0.00108696), (1.0, 0.00760456), (0.5, 0.00137646), (0.25, 0.00045496), (0.5, 0.00099059), (1.0, 0.00769231), (0.5, 0.00163399), (0.25, 0.00043262), (0.5, 0.00111421), (1.0, 0.0077821), (0.5, 0.00074683), (0.22222222, 0.00077459), (0.5, 0.00137646), (1.0, 0.00763359), (0.5, 0.00081766), (0.25, 0.00049838), (0.5, 0.00163132), (1.0, 0.00769231), (0.5, 0.00074822), (0.25, 0.00053419), (0.5, 0.00077549), (1.0, 0.00498753), (0.5, 0.00169635), (0.25, 0.00050391), (0.5, 0.00081733), (1.0, 0.00772201), (0.5, 0.00137646), (0.25, 0.00053447), (0.5, 0.00074627), (1.0, 0.00896861)]

    Mean: (0.55590196, 0.00266957)
    Standard Deviation: (0.27646832, 0.0031024)
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    Frequency Sequences: [(0.33333333, 0.00018292), (0.5, 0.00106101), (0.5, 0.00091283), (1.0, 0.003861), (0.25, 0.00057225), (0.5, 0.0010015), (1.0, 0.00900901), (0.5, 0.00066511), (0.25, 0.000594), (0.5, 0.00105042), (1.0, 0.00888889), (0.5, 0.00143988), (0.22222222, 0.00043526), (0.5, 0.00119546), (1.0, 0.00913242), (0.5, 0.00123153), (0.28571429, 0.00035193), (0.28571429, 0.00050929), (0.25, 0.00052043), (0.5, 0.00147493), (1.0, 0.00900901), (0.5, 0.0010352), (0.25, 0.00045455), (0.5, 0.00126662), (1.0, 0.00913242), (0.5, 0.00116959), (0.25, 0.00043262), (0.5, 0.0014771), (1.0, 0.00892857), (0.5, 0.00073502), (0.25, 0.00052757), (0.5, 0.00137836), (1.0, 0.00913242), (0.5, 0.00108932), (0.25, 0.00042836), (0.5, 0.00111421), (1.0, 0.00763359), (0.5, 0.00137836), (0.25, 0.00045455), (0.5, 0.0008726), (1.0, 0.00854701), (0.5, 0.00073341), (0.22222222, 0.00062657), (0.5, 0.00111111), (1.0, 0.00754717), (0.5, 0.00130124), (0.25, 0.00045444), (0.5, 0.00098961), (1.0, 0.00763359), (0.5, 0.0015186), (0.25, 0.00043262), (0.5, 0.00111297), (1.0, 0.00763359), (0.5, 0.00137646), (0.25, 0.00045455), (0.5, 0.00099108), (1.0, 0.00763359), (0.5, 0.00162999), (0.25, 0.00043234), (0.5, 0.00111297), (1.0, 0.00896861), (0.5, 0.00134409), (0.25, 0.00045444), (0.5, 0.00096899), (1.0, 0.00913242), (0.5, 0.00157604), (0.28571429, 0.00038767), (0.5, 0.00111049), (1.0, 0.00888889), (0.5, 0.00134228), (0.25, 0.00045455), (0.5, 0.00099108), (1.0, 0.00714286), (0.22222222, 0.00032733), (1.0, 0.00909091), (0.5, 0.00108814), (0.2, 0.00037195), (0.5, 0.00099108), (1.0, 0.00766284), (0.5, 0.00163132), (0.25, 0.00049838), (0.5, 0.00081666), (1.0, 0.00772201), (0.5, 0.00099108), (0.25, 0.00045475), (0.5, 0.00137931), (1.0, 0.00769231), (0.5, 0.00111483), (0.25, 0.00043281), (0.5, 0.00162602), (1.0, 0.00769231), (0.5, 0.00099157), (0.22222222, 0.00045321), (0.5, 0.00137646), (1.0, 0.0077821), (0.5, 0.00111421), (0.25, 0.00043281), (0.5, 0.00162866), (1.0, 0.00772201), (0.5, 0.00099108), (0.25, 0.00045475), (0.5, 0.00132363), (1.0, 0.00766284), (0.5, 0.00111359), (0.22222222, 0.00050188), (0.5, 0.00162866), (1.0, 0.00873362), (0.5, 0.0007391), (0.25, 0.00053419), (0.5, 0.00137836), (1.0, 0.00760456), (0.5, 0.00081733), (0.22222222, 0.00050761), (0.5, 0.00156986), (1.0, 0.00769231), (0.5, 0.00074878), (0.25, 0.00053419), (0.5, 0.00137836), (1.0, 0.00769231), (0.5, 0.00081733), (0.25, 0.00049875), (0.2, 0.00026842), (0.25, 0.00043281), (0.5, 0.00162866), (1.0, 0.00769231), (0.5, 0.00099256), (0.25, 0.00045475), (0.5, 0.00138026), (1.0, 0.00757576), (0.5, 0.00111359), (0.25, 0.00043262), (0.5, 0.00162866), (1.0, 0.00769231), (0.5, 0.00099059), (0.25, 0.00053362), (0.5, 0.00081666), (1.0, 0.00769231), (0.5, 0.00136986), (0.25, 0.00053447), (0.5, 0.00074794), (1.0, 0.00766284), (0.5, 0.00163399), (0.25, 0.00043262), (0.5, 0.00111545), (1.0, 0.00760456), (0.5, 0.00137836), (0.25, 0.00045496), (0.5, 0.0009828), (1.0, 0.00938967), (0.5, 0.00158856), (0.22222222, 0.00043526), (0.5, 0.00108696), (1.0, 0.00760456), (0.5, 0.00137646), (0.25, 0.00045496), (0.5, 0.00099059), (1.0, 0.00769231), (0.5, 0.00163399), (0.25, 0.00043262), (0.5, 0.00111421), (1.0, 0.0077821), (0.5, 0.00074683), (0.22222222, 0.00077459), (0.5, 0.00137646), (1.0, 0.00763359), (0.5, 0.00081766), (0.25, 0.00049838), (0.5, 0.00163132), (1.0, 0.00769231), (0.5, 0.00074822), (0.25, 0.00053419), (0.5, 0.00077549), (1.0, 0.00498753), (0.5, 0.00169635), (0.25, 0.00050391), (0.5, 0.00081733), (1.0, 0.00772201), (0.5, 0.00137646), (0.25, 0.00053447), (0.5, 0.00074627), (1.0, 0.00896861)]

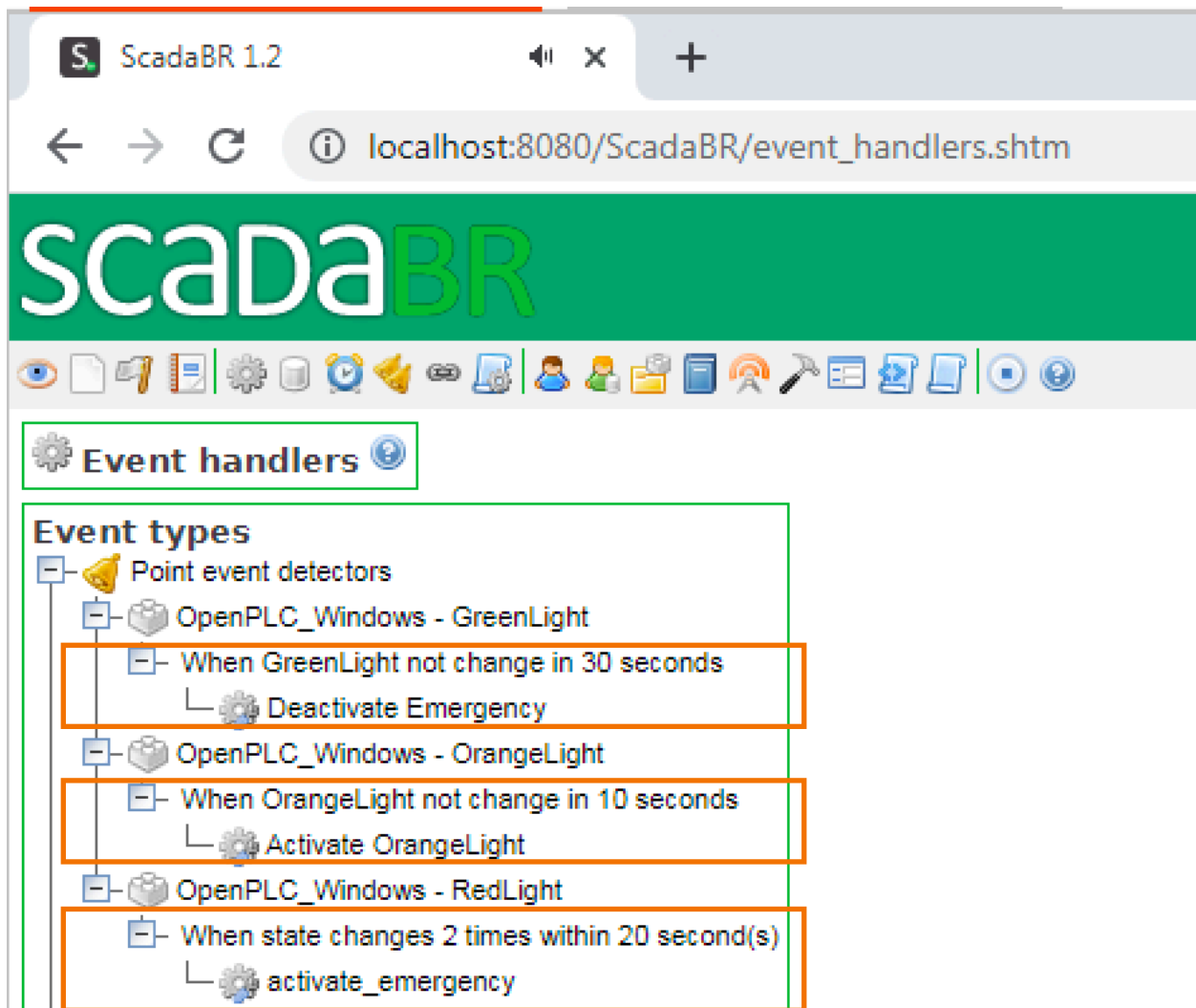
    Mean: (0.55590196, 0.00266957)
    Standard Deviation: (0.27646832, 0.0031024)
```

Multiple Events

Events I setup for the experiment

1. If RedLight changes twice in 20 seconds => Activate Emergency
2. If GreenLight not change in 30 seconds => Deactivate Emergency (This is a backup event for the first event, incase OpenPLC misses the self resetting network traffic)
3. If OrangeLight not change in 10 seconds => Make OrangeLight to 1

Event Handlers



And it works as expected

Orange Light activates after long stay in emergency mode (Orange box below)

The screenshot shows the ScadaBR 1.2 web interface. The 'Watch list' table contains the following data:

Point	Value	Last Update	Alarm	Event
OpenPLC_Windows - GreenLight	1	13:14:24	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - Orangelight	1	13:14:24	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - RedLight	0	13:14:24	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - HMI_EmergencyGreenPb	1	13:14:24	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - Pb_Pedestrians	0	13:14:24	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The row for 'OpenPLC_Windows - Orangelight' is highlighted with an orange box. The interface also shows a 'Points' tree on the left and a 'Chart' section at the bottom.

And Orange Light back to normal after value changes to 1 (Orange box below)

The screenshot shows the ScadaBR 1.2 web interface after a value change. The 'Watch list' table now shows:

Point	Value	Last Update	Alarm	Event
OpenPLC_Windows - GreenLight	1	13:14:28	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - Orangelight	0	13:14:28	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - RedLight	0	13:14:28	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - HMI_EmergencyGreenPb	1	13:14:28	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OpenPLC_Windows - Pb_Pedestrians	0	13:14:28	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The row for 'OpenPLC_Windows - Orangelight' is highlighted with an orange box. The value has changed from 1 to 0, and the last update time is now 13:14:28. The interface also shows a 'Points' tree on the left and a 'Chart' section at the bottom.