

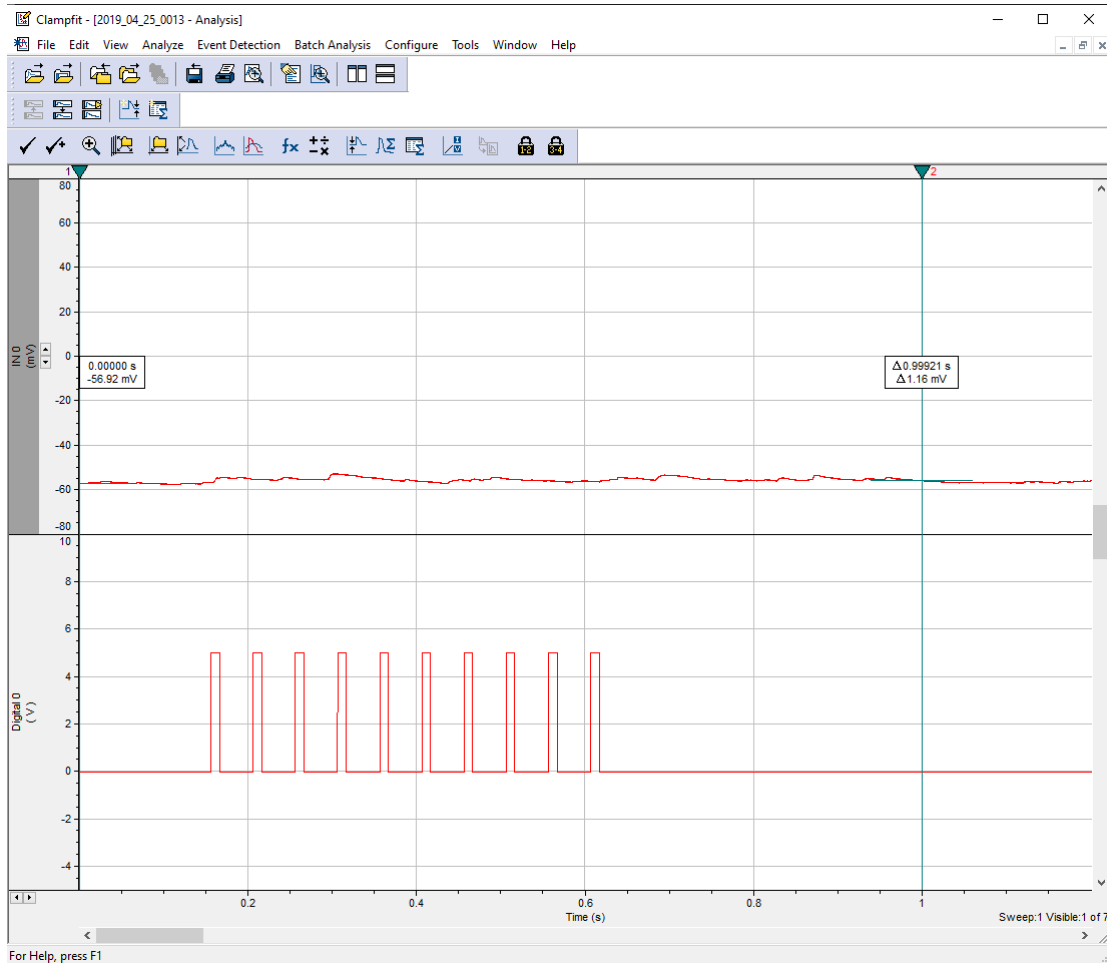
CHR2 event detector/analysis LabView and Python Integration Proof of concept

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2022.11.16

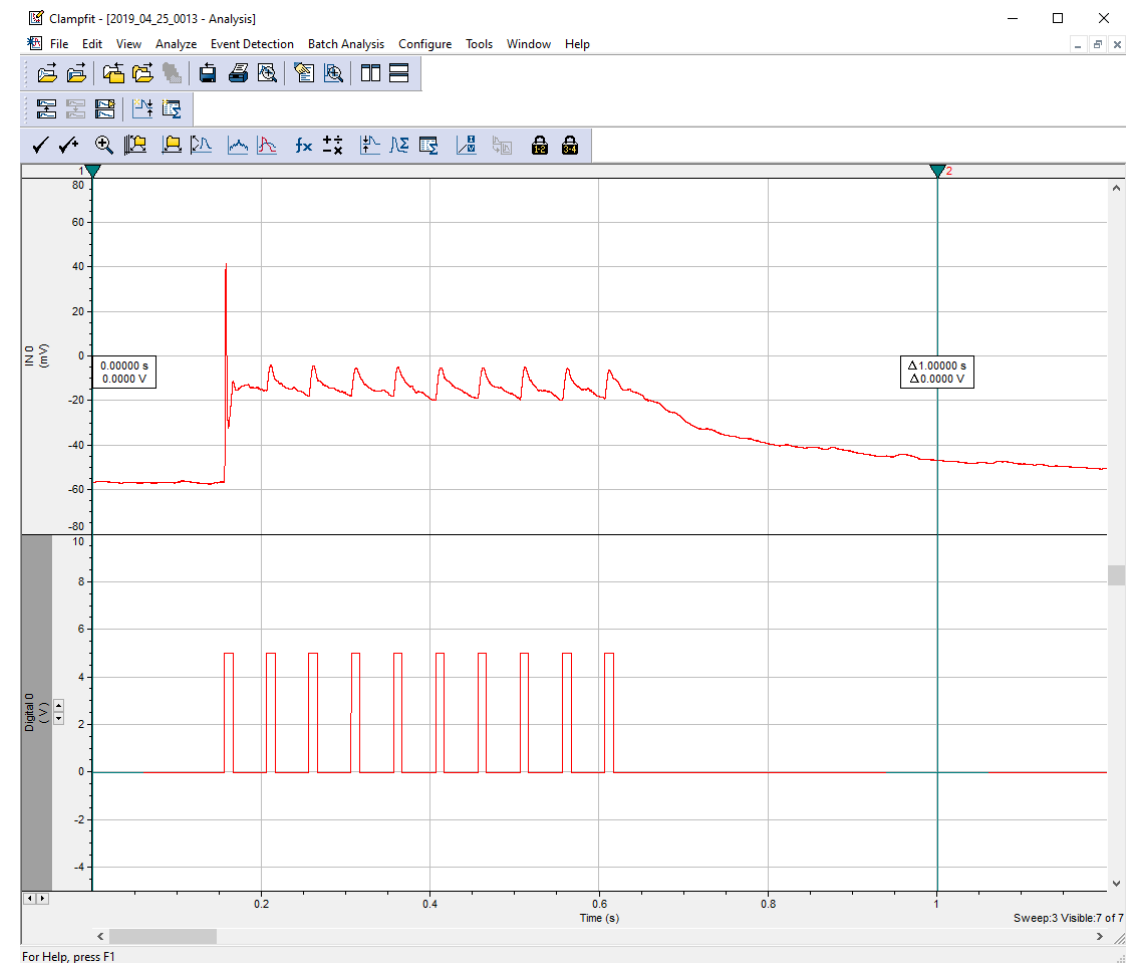
Overview of solution steps

1. Loads a current clamp trace with the digital stimulus waveform into LabView
2. Passes this data to a python session for time locked event analysis
3. Simple test determines if membrane activity is CHR2+ (based on timing and magnitude of response to stimulus)
4. Passes extracted information about the stim response back to LabView
5. LabView displays a green light if CHR2 was detected in that trace

Input data (time, membrane potential, digital stimulus waveform) CSV of traces extracted from CHR2 recording (data collected in Guler lab)



NO ChR2 response
(Light path shutter is closed)



Classic ChR2 response example

time_ms
0 0.02 0.04 0.06 0.08

Sample timestamp vector

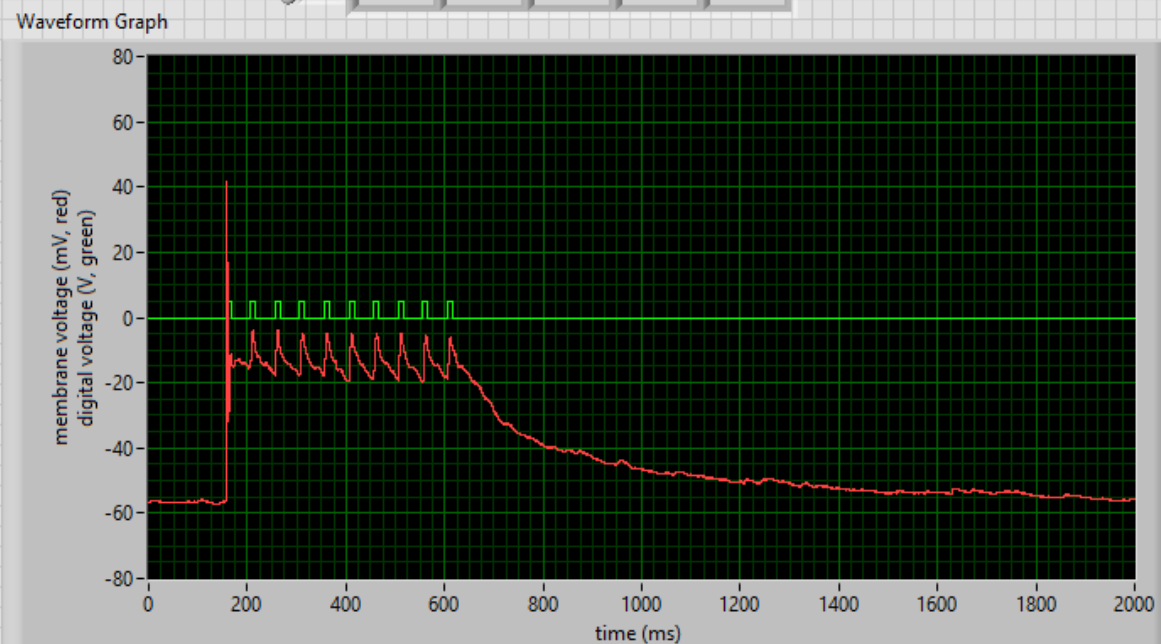
Current Clamp Recording

Digital Stimulus Waveform

voltage_mV
0 -56.5796 -56.6101 -56.6101 -56.6406 -56.6406

digital_V
0 0 0 0 0

file path to analysis file
C:\LabView_Python_Waveform_Analysis\Data\2019_04_25_0013_t3_raw_csv.csv



Peak spike magnitude (mv)
41.5649

Time to peak from stimulus onset (ms)
1.78

Abs. Spike Amplitude (mV)
97.9187

Likely CHR2 response?

Strong action potential/spike ✓

Fast enough to be CHR2 driven ✓

Large spike ✓

CHR2 response successfully detected!

python version
3.6

path to python module
C:\Program Files\National Instruments\LabVIEW 2022\examples\Connectivity\Python\support\PythonNode_CHR2_functions.py

python error in (no error)
status code
0

python error out
status code
0

time_ms
0 0.02 0.04 0.06 0.08

Sample timestamp vector

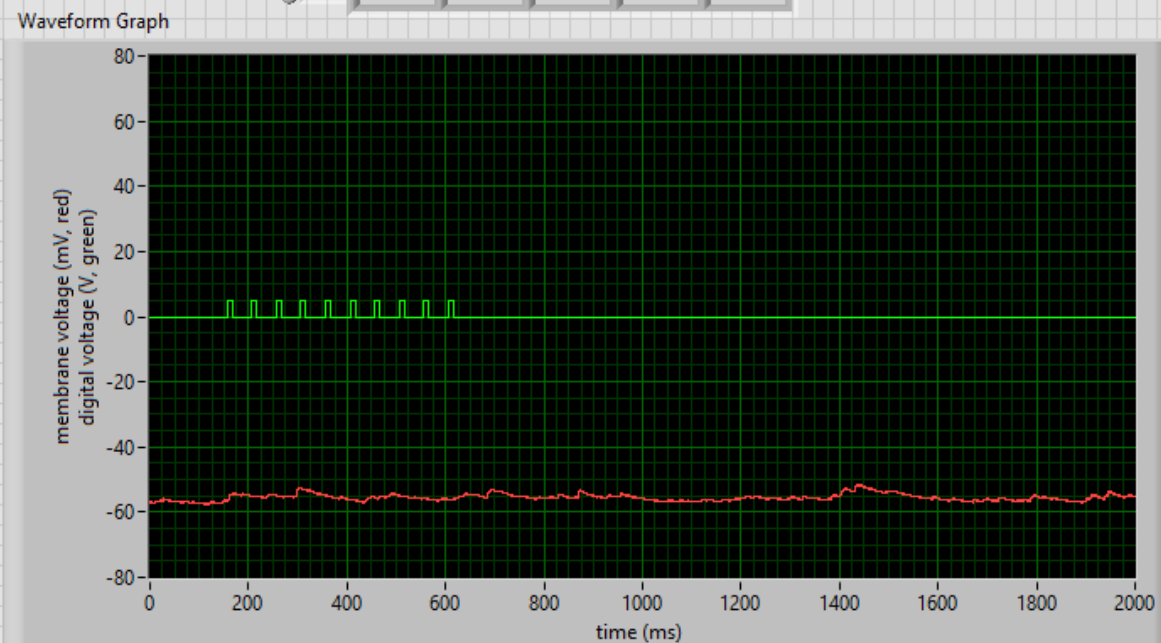
Current Clamp Recording

Digital Stimulus Waveform

voltage_mV
0 -56.9153 -56.8848 -56.9153 -56.9458 -56.9458

digital_V
0 0 0 0 0

file path to analysis file
C:\LabView_Python_Waveform_Analysis\Data\2019_04_25_0013_t1_raw_csv.csv



python version
3.6

path to python module
C:\Program Files\National Instruments\LabVIEW 2022\examples\Connectivity\Python\support\PythonNode_CHR2_functions.py

python error in (no error)

status	code
✓	0

source

python error out

status	code
✓	0

source

Peak spike magnitude (mv)

-54.4735

Doesn't pass 0 mV

Time to peak from stimulus onset (ms)

7.58

Too slow to be CHR2

Abs. Spike Amplitude (mV)

2.11243

Low amplitude/silent membrane activity

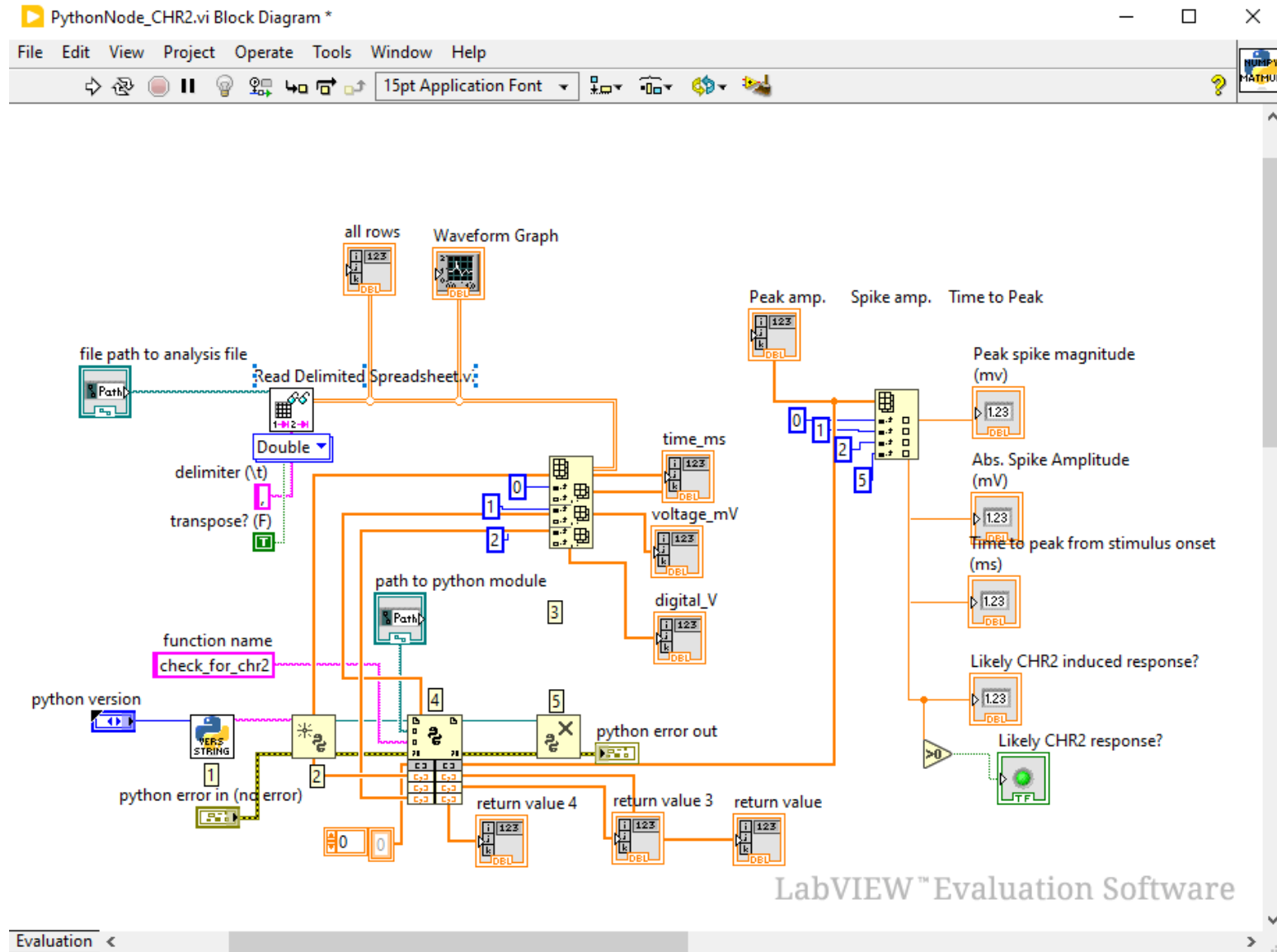
Likely CHR2 response?



CHR2 response not detected!

Block graph for LabVIEW

Passes arrays to Python session for analysis



Note: sincerest apologies for poor graph formatting and verbose/vestigial indicators etc.

Credit/Acknowledgements

Source code and more information at:

[https://github.com/src8wc/Labview Python CHR2 Proof of Concept](https://github.com/src8wc/Labview_Python_CHR2_Proof_of_Concept)

LabView 2022Q3:

<https://www.ni.com/en-us/shop/labview.html>

Python v3.6.0, with NumPy:

<https://ipython.org/> <https://numpy.org/>

Helpful examples and discussion for integrating a python session into a LabView VI:

<https://www.ni.com/en-us/support/documentation/supplemental/18/installing-python-for-calling-python-code.html>

<https://forums.ni.com/t5/LabVIEW/Python-Node-in-LV2018/td-p/3797256>