Instructions on setting up wrapped visual stimulation – v1.0 October 17th, 2025

– after Allen NPX Visual Coding (Stimulus Set 1).

References:

<https://brainmapportal-live-4cc80a57cd6e400d854-f7fdcae.divio-media.net/filer_public/80/75/8075a100-ca64-429a-b39a-569121b612b2/neuropixels_visual_coding_-_white_paper_v10.pdf>

# see also:

<https://cdck-file-uploads-canada1.s3.dualstack.ca-central-1.amazonaws.com/flex027/uploads/brainobservatory/original/2X/d/d7eeb93a17be13d8a7181c726b8f06a47f74795d.pdf>

<https://observatory.brain-map.org/visualcoding/stimulus/drifting_gratings>

<https://observatory.brain-map.org/visualcoding/stimulus/static_gratings>

<https://observatory.brain-map.org/visualcoding/stimulus/natural_scenes>

## Set up the new monitor (ASUS PA248Q)

Once the monitor arrives:

1. Plug it in the video card of the experiment PC.
2. With the monitor directly and comfortably facing you, perform Display Gamma Calibration using the built-in calibration tool.
3. To open the tool: Search for "calibrate display color" in the Windows search bar and select the result to open the tool. Follow the instructions to complete the procedure. Note: as a result of the first step, brightness should be less than 50% (around 30%) and contrast should be at around 50%.
4. Open Display Settings and note the identifier assigned to the rig monitor. Update line 26 of the script accordingly (you can open the script with Notepad++, and save it):

C:\Users\SNeurobiology\Documents\GitHub\WarpedVisualStim\_2025\experimentProtocol\_afterNPXAllenStSet1\_combined.py

1. Position the monitor sensor in the bottom-right corner of the monitor. Connect it to the oscilloscope for a first-pass test (see next paragraph).

## Test that visual stimuli are correctly displayed on the new monitor

Open Anaconda Prompt and launch the visual stimulus protocol:

conda activate wvs

cd C:\Users\SNeurobiology\Documents\GitHub\WarpedVisualStim\_2025

python experimentProtocol\_afterNPXAllenStSet1\_combined.py

1. Check that stimuli are correctly displayed on the intended screen.
2. Visualize the monitor sensor signal on the oscilloscope and make sure you see a HIGH signal only when the indicator square is white (i.e. at the beginning of any new stimulus). Conversely, the signal should be LOW whenever the square is gray or black. -- *If this test fails, perhaps the display gamma calibration was not done properly. This needs to be fixed before continuing.*
3. Let the whole stimulus set run (it will take ~1.5 hours). At the end, check the whole feedback in anaconda prompt and annotate it (please send it to me too, I would like to give a look). In particular, note the frame duration feedback, that looks like this:

Total number of frames : 424.

Total length of display : 7.14062 second.

Expected length of display : 7.06667 second.

Mean of frame intervals : 16.84 ms.

S.D. of frame intervals : 5.39 ms.

Shortest frame: 0.00 ms, index: 191.

Longest frame : 46.88 ms, index: 339.

Number of frames longer than 0.020 second: 37; 8.73%

Number of frames longer than 0.033 second: 3; 0.71%

Number of frames longer than 0.050 second: 0; 0.00%

Number of frames longer than 0.100 second: 0; 0.00%

* **The number of frames longer than 0.020 second should be fairly low, ideally under 7-8%. The number of frames longer than 0.033 second should be close to zero (under 1%).**

*If this fails, we may need to increase the downsampling from 4 to 5 and check again.*

*To do that, we need to change line 35:*

mon\_downsample\_rate = 5

*but also we need to replace* images\_original.tif *in:*

C:\Users\SNeurobiology\Documents\GitHub\WarpedVisualStim\_2025\WarpedVisualStim\staticImages

*with the one from the subfolder:*

\ASUS\_PA248Q\_downsampled\_5x

*copying it to the main folder and renaming it* images\_original.tif

## Set up to get ready for experiments:

1. Position the monitor in the rig at exactly 15 cm from the eye of interest, with an angle such that the display plane is perpendicular to the mouse’s eye, and the display center is perfectly aligned with the eye, both horizontally and vertically.
2. Open the script (with notepad++):

C:\Users\SNeurobiology\Documents\GitHub\WarpedVisualStim\_2025\experimentProtocol\_afterNPXAllenStSet1\_combined.py

1. Change lines 49 and 55 to True, and then save the script:

49 ds\_is\_triggered = True

55 ds\_is\_sync\_pulse = True

Connect the Trigger pin in the NIDAQ to the trigger Arduino.

Connect the Sync pin out ot the NIDAQ to a channel in your recording system.

Test once that everything works as it should and all the signals (including NIDAQ Sync and monitor sensor), are correctly recorded. *(To stop the stimuli while running, press esc)*

## Starting an experiment.

When setting up an experiment, launch the python script so that the stimuli are ready to go and waiting for your trigger. As before:

conda activate wvs

cd C:\Users\SNeurobiology\Documents\GitHub\WarpedVisualStim\_2025

python experimentProtocol\_afterNPXAllenStSet1\_combined.py

When ephys (and camera) recording is ON, start the trigger.