Marjorie Xie

Visual Stimulus Notes

Last update: 08/03/16

playstim.m: Accepts three inputs from the user: stimulus function name (e.g. ‘samplestim1’ - assumed to be written by user, saved in the correct folder, and added to path), stimulus duration (sec), start signal. Runs the stimulus function specified by user, passing in the necessary parameters. Borrowed from Helen: initialization of NIDAQ and Psychtoolbox (initPyschTbx.m), plotting of the voltage readout of the photodiode.

Features to include in code

* ESC key should be able to stop the stimulus any time. But ~KbCheck doesn’t seem to work…
* More flexible way to read in parameters

TrackStim.cpp is an example how we might read in stimulus parameters from .txt file provided by the user. Scroll all the way down to the function readParams() – szfile is the stimulus file. drawScene() checks which stimulus type is specified in the stimulus file and calls the respective function for drawing that stimulus type.

Questions

1. LightCrafter Control settings
   1. Would we need to reset these each time we restart the LightCrafter? How do you save settings? Would the settings change depending on the stimulus we want to present?
   2. Why are we using a bit depth of 6? Why not 8?
2. Stimulus
   1. black = BlackIndex(screenNumber); Does not give me pitch black. When I display blue light, “black” is really just low luminance, which is nonetheless still blue!
   2. What is the wavelength of the blue light from the lightcrafter and how does it compare to the blue we were using from the DLP? Does it matter if we will be using a visual stimulus filter?
3. Psychtoolbox
   1. Ifi = “vertical refresh rate of the monitor” – vertical as opposed to what?
   2. Using KbCheck, the stimulus doesn’t stop when I hit ESC. Is this because we’ve set Psychtoolbox code to MaxPriority so it might not listen for keyboard presses?

Building blocks of an image

Images can be presented up to a frame rate of 120Hz. A single video frame is composed of 3 color channels RGB. Each color gets a time slot within that frame of 120Hz/3 = 2.78ms. Each color time slot is partitioned into 8 bit-planes (e.g. G0-G7). This all means that a single video frame is a series of bit-planes presented in sequence. In terms of hardware, each bit in a bit-plane gets a set of mirrors in on/off mode. The intensity of the color is controlled by the amount of time mirror is on.

Pattern exposure and period set the amount of time a pattern is presented and the amount of time between patterns. So if you set exposure = period = 5000 (5ms per pattern), you barely see any flicker. But if you set exposure = period = 10000 (10ms per pattern), you see flickering between frames.

Hardware Caution

“The DLP LightCrafter 4500 is an actively cooled system that has a thermal limit resulting in total simultaneous red, green, and blue LED currents less than 4.3 A for continuous LED operation. Do not overheat the system by turning all LEDs at maximum power during prolonged and simultaneous LED use. **Exceeding more than 4.3 A** for continuous or simultaneous LED operation can **damage the LightCrafter** 4500 LEDs.”