USB-based trigger

Arduino based hardware trigger. PC uses a (virtual) serial message and Arduino forwards it to digital outputs.

20160218

Performed tests

Python program sends both LPT trigger followed by a USB (serial) trigger. Rising times are measured with the oscilloscope. Traces are average across 128 repetitions.

Blue : LPT trigger
Orange : USB trigger

In one case with (CNBI-NB-20) we ran the program simultaneously with Matlab performing some computations:

```
>for i=1:1000; a=rand(1000); pinv(a);end;
```

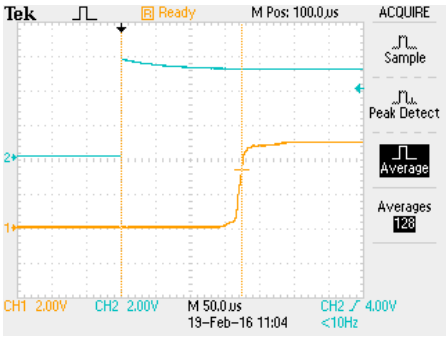
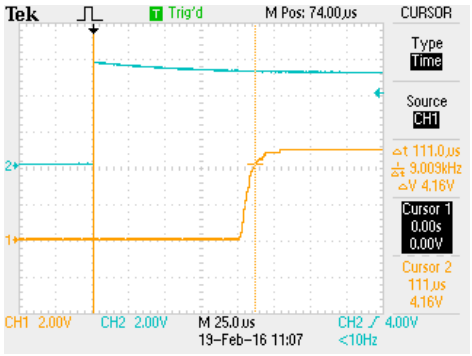
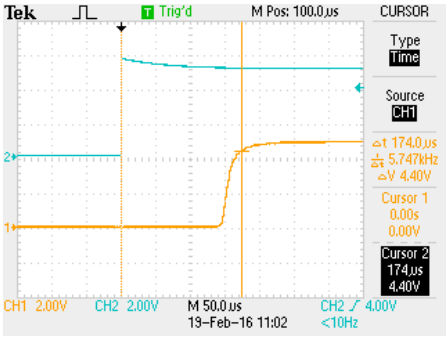
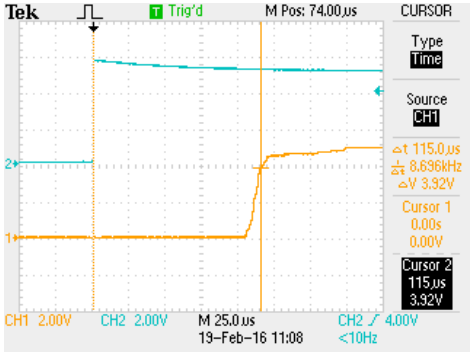
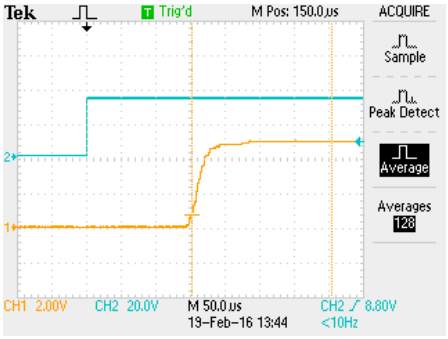
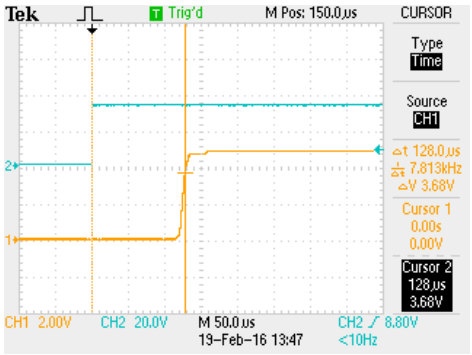
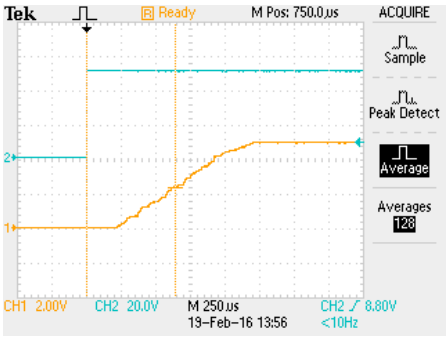
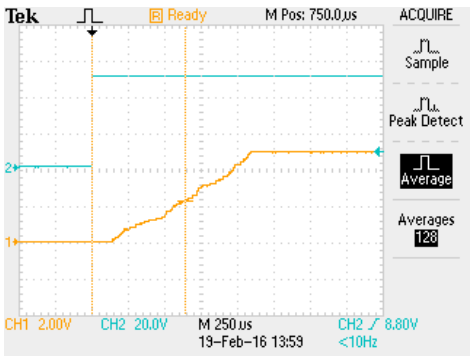
Outcome:
In *newer machines* the delay when sending first the LPT and then the serial is between 150-200 us
When we send first the serial trigger and then the LPT, the LPT trigger appears between 100-150 us before

As expected, the LPT trigger is processed faster by the machine (~50 us vs 200 for the serial). However, this should not have any effect for triggering EEG recordings.

In the *old machine,* there was a large variability ranging from 250 us to 1250 us. Notice that despite this large variability, the resolution seem still fine for standard EEG experiments

	LPT -> SERIAL	**SERIAL->LPT**

	self.lpt.signal(1) # send LPT trigger
	ser.write('5') # send Serial trigger (set to one)
	sleep(0.01)
	ser.write('5') # end Serial trigger (set to zero)
		ser.write('5')
		self.lpt.signal(1)
		sleep(0.01)
		ser.write('5')

CNBI-NB-20 Lenovo ThinkPad T540p i7 2.5Ghz * 8 RAM 16 GB		
CNBI-NB-20 +MATLAB computations		
CNBI-NB-16 Lenovo W510 4 GB (To confirm)		
CNBI-NB-04 Dell E5400 Core Duo P8600 2.4Ghz*2 Ram 4GB		

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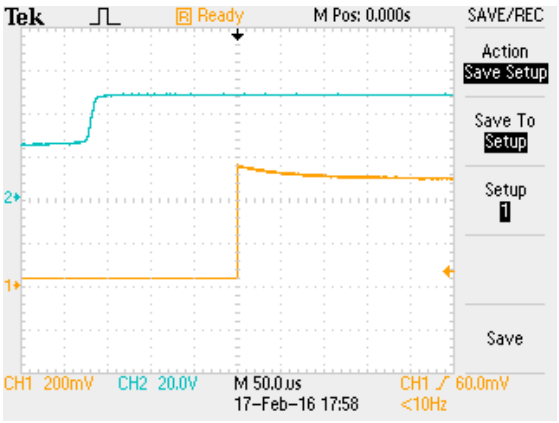
Measured delay CNBI-NB-20

Test 1 Python program sends an LPT trigger followed by a USB (serial) trigger. Traces are average across multiple repetitions. Each horizontal division is 50 us Blue : LPT trigger Orange : USB trigger Average delay lies between 200us and 150us	
Test 2 Python program sends one USB trigger sleeps 10ms, then sends another trigger Blue : LPT trigger Orange : USB trigger Tested with heavy matlab computations running concurrently.