

How to Control Tabor AWGs with Python

Using the IVI Driver

In previous tutorials, we have shown how to install all the necessary drivers and we also shown how to communicate with Tabor AWGs using SCPI. Another way of using Python to control Tabor AWGs, is by operating using the Tabor IVI driver. This way, one can communicate with the Tabor AWG, using a Higher-level functions. In this tutorial, we will give an example of how you can communicate with the Tabor AWG using the IVI driver.

For this tutorial, we will use win7 64bit OS, Python 2.7.12 (Anaconda2 4.2.0 64-bit), a Tabor WX2184C using TCP/IP interface and it's latest version of the WX218x 64bit IVI driver. To ensure you successfully established all the necessary settings for remote control over the Tabor instrument using LAN/USB/GPIB, please make sure you have already installed the latest <u>NI-VISA</u>, <u>IVI Compliance Package</u> from the National Instruments website and <u>Tabor's IVI driver</u> as instructed in the first tutorial of the series "How to Control Tabor AWGs with Python – Getting started". Also please go over our <u>connectivity tutorials</u> on the Tabor's website, to insure you installed all necessary drivers.

→ To connect and control the Tabor Instrument using the IVI Driver

- 1. Set the USB/LAN/GPIB as the remote interface, using the Tabor's front panel buttons.
 - a. If you choose to communicate using LAN interface:

Go to "Utility"->"Remote Interface"->"LAN". Modify the IP Address, Subnet Mask & Default Gateway as necessary to ensure TCP/IP connectivity between the Tabor device & the PC. For more information regarding TCP/IP connectivity, please refer to <u>Here</u>.

b. Go to "Utility"->"Remote Interface"->"Select Interface"->"Control from Interface". Press Enter to select the active Interface you need. Wait for the answer "Done". We chose to demonstrate using LAN.

▶ Utility ▶ Remote Interface			▶ Utility ▶ Remote Interface			
Select Interface	CTCP/IP Network Physical Addres Host Name:	Properties s: 3C:D9:2B:6E:F1:80 YARON-HP	Select Interface	Control from Int	terface JSB 📀 LAN	
GPIB Total USB	DHCP Enabled: IP Address: Subnet Mask: Default Gatewa	No ♦ 192.168. 0 .197 255.255.255. 0 y: 0 . 0 . 0 . 0	GPIB Total USB	NOTE: Press Ente interface. Connected (GD * IP Address * Subnet Mask	r to select the active BIP) 192.168.0.11 k 255.255.255.0	
LAN	Note: Modificati only after execu Select Interface	ons will take effect ting: ->LAN->Enter	LAN	* Def Gateway	/ 192.168.0.100	
BASE MODE	SYNCICH1->CH23	EVENT INPUT	BASE MODE	SYNCICH1->CH2]	EVENT INPUT	
COUPLE: DC RUN: CONT	POS: ØPts STATE: OFF	LEVEL: +1.600 SLOPE: POSITIVE	COUPLE: DC RUN: CONT	POS: 0Pts STATE: OFF	LEVEL: +1.60V SLOPE: POSITIVE	



On your computer, go to Start->> Anaconda2 ->> Anaconda Prompt, to open anaconda's command promt:



3. From the command prompt, use 'conda list' to view the already installed libraries that came with your anaconda installation:

Anaconda Prompt	
<pre>(C:\Program Files\Anaconda2) C:\Users\elad.TABOR\$B\$>conda list</pre>	H

4. If you don't find Python's comtypes library on the list of installed libraries, please type 'pip install comtypes' from the command line in order to install it.

📰 Anaconda Prompt			- • ×
bitarray	0.8.1	py27_1	
blaze	0.10.1	py27_0	
bokeh	0.12.2	py27_0	
boto	2.42.0	py27_0	=
bottleneck	1.1.0	np111py27_0	
bzip2	1.0.6	vc9_3 [vc9]	
cdecimal	2.3	py27_2	
cffi	1.7.0	py27_0	
chest	0.2.3	py27_0	
click	6.6	py27_0	
loudpickle	0.2.1	py27_0	
lyent	1.2.2	py27_0	
lovama	N 2 2	py27_0	
omtypes	1.1.2	ру27_0	
onda	1.2.7	py27_0	
onda-build	2.0.2	py27_0	
onfigobj	5.0.6	py27_0	
onfigparser	3.5.0	py27_0	
onsole_shortcut	0.1.1	py27_1	
ontext11b2	Ø-5-3	py27_0	
ryptography	1.5	py27_0	
uri	7.49.0	0CA-0 [0CA]	
ycler	0.10.0	py27_0	
ython	0.24.1	py27_0	
ytoolz	0.8.0	py27_0	



5. Open NI-MAX and configure the instrument address as raw socket:

TCPIP0::192.168.0.197:5025::SOCKET - Measurement & Automation	Explorer	ddress as raw socket:	
ICHIPO:192.168.019/#3025#30CKE1 - Measurement & Automation File Edit View Tools Help My System Data Neighborhood Devices and Interfaces Software ICHPO:192.168.0.180:5025::SOCKET Software Software M ID rivers Remote Systems 	Explorer Save ≳ Refresh ≥ Op Settings Name Hostname IPv4 Address Status Port Number VISA Resource Name	2/IP Settings	Hide Help What do Yelde Help What do Yelde Help What do Yelde Help What do Yelde Help Yeld
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6. Download the attached zip folder for this tutorial from the Tabor website tutorials section. Unzip & save the files under the same directory on you PC's hard drive.



Open Spyder or any other Python IDE & Run Example4.py.



Spyder (Python 2.7)						
File Edit Search Source Run Debug Consoles Projects Tools View Help						
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Editor - C: \Users\elad.TABORSBS\Documents\Elad work\tutorials\python\IVI dirver\Example4.py	×v	/ariable explorer			ć	9 ×
🗅 Example-py 🖾 🙀 📩 🐑						\$
1 ''' 2 TVT-Evamle	^ [Name	Туре	Size	Value	^
3 This example illustrates how to call IVI-Driver from Python. 4 It is based on the Arbitrary-Sequence Example of the WX218x IVI-Driver.		chanName	str	1	Channel1	
5 6 In order to install comtypes (python library) use the following command from command-line:	1	errMsg	unicode	1	No error	=
7 >> pip install comtypes	- 4	errNb	int	1	0	
9 ''' 10 import contypes	1	gain	float	1	0.5	
11 import comtypes.client as cc		i	int	1	2	
12 import contypes.gen as cg 13 14 import sur	:	jump_flag	uint8	(3L,)	array([0, 0, 0], dtype=uint8)	
15 import avery as an		loop_count	list	3	[4, 2, 1]	
17 import math		num_waves	int	1	3	
19 19 20 comtunes (cInitialize()		offset	int	1	0	
		Variable explorer File	explorer Help			-
23 #cc.GetModule('IviSessionFactory.dll')	I	TPythan console				₹×
24 #cc.GetModule('IviFgenTypeLib.dll') 25	C	Console 1/A 🛛		Q		
26 27 cc.GetModule('wx218x.dll') 28 29 # The GUID of the registered wx218x COM Object: 30 wx218x_guid = '{185D62A6-86BC-480D-8FEF-F35F0A0FC943}' 31	1 1 1	InstrumentModel: W InstrumentFirmware InstrumentManufact	WX2184C * reRevision: 2.19 ccturer: Tabor Electronics			•
32 strStandardInitOptions = 'Cache=true, InterchangeCheck=false, QueryInstrStatus=false, RangeCheck=true	A	Arbitrary Sequence	Example			
34 strResourceDesc = 'TCPIP::192.168.0.197::5025::SOCKET' 35 36 WX218xLib = cg.WX218xLib #cg.WX218xLibEB5FFD1F_1808_400E_9FED_46AF13B65982_0_2_0	-	- Select Channel 1 - Create 3 segment: sine-cycle - Create a Simple 3	<pre>iect Channel 1 iate 3 segments (of various lengths) each with single c-cycle aet a Simple Sequence (based on the defined segments)</pre>			Е
38 39 wx218x = None	•		atus = 0 (No e	ccoc)	· · · ·	
40 41 42 try:	I	In [2]:				
43 wx218x = cc.CreateObject(wx218x_guid) 44 wx218x Tritialize(steResourceDesc_Tous_Tous_steStandardInitOntions)	-	a -1 b b b c c c c c c c c c c	1			Ŧ
Permissions: RW End-of-lines: CRLF Encoding: UTF-8-GUESSED Line: 1 Column: 4 Memory: 88 %						

Example 4 will demonstrate how to:

a. Create 3 different segments (each as one cycle of a sine wave), each with different number of points:



b. Create a sequence table with the first segment to loop 4 times, the second twice and the third only once. The sequence will run continiously as no jump flag was set to '1':

```
93 # Sequence 1:
94 segment_nb = [ seg_handle[0], seg_handle[1], seg_handle[2] ]
95 loop_count = [ 4, 2, 1 ]
96 jump_flag = np.array([0, 0, 0], dtype=np.uint8)
97
```



c. Following the examples above, as can be seen on scope, this simple sequence was created continiously :



The outputted sequence.

- 7. Using the Tabor WX AWGs only, you can get access to even one more level of sequencing, thus creating a sequences of sequences. In order to demonstrate the advance sequencing abilities of Tabor's WX family of AWGs, please run 'ivi_example.py' also attached to this tutorial.
- 8. For more information regarding the IVI driver functions:
 - a. Go to: C:\Program Files (x86)\IVI Foundation\IVI\Drivers\wx218x

& open the "WX218x" HTML file:

C C v v v v v v v v v v v v v v v v v v							
Organize 🔻 😰 Open 🔻 Burn New folder 🔠 🔻							
🔆 Favorites	Name	Date modified	Туре	Size			
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🔚 Recent Places	😬 ConfigStore	10/20/2014 2:52 PM	XML Document	4 KB			
	Readme	12/11/2014 4:19 PM	Text Document	13 KB			
🥽 Libraries	😤 WX218x	12/18/2014 9:33 AM	Compiled HTML	2,087 KB			
Documents	wx218x.fp	12/18/2014 8:42 AM	FP File	372 KB			
J Music	wx218x.sub	11/5/2014 11:47 AM	SUB File	76 KB			
Pictures							





In the next tutorials of the series "How to Control Tabor AWGs with Python", we will explain how to properly manage the Tabor AWG memory followed by few interactive examples.

For More Information

To learn more about how to remote control Tabor instruments using Python, visit our website Support & Tutorials zone. If you encounter difficulties with connecting to Tabor units using Python, please contact us at support@taborelec.com and our support team will gladly help. For more of Tabor's solutions or to schedule a demo, please contact your local Tabor representative or email your request to info@tabor.co.il. More information can be found at our website at www.taborelec.com

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