Programming Example: Building an Arb with 16-bit steps (SDG2000X/SDG6000X) using Python

March 07, 2018

The SIGLENT SDG2000X and SDG6000X feature 16-bit voltage step resolution. This provides 65,535 discrete voltage steps that can cover the entire output range (20 Vpp into a High Z load) which can effectively be used to test A/D converters and other measurement systems by sourcing waveforms with very small changes.

In this example, we use Python 2.7 and PyVISA 1.8 to create a ramp waveform that is comprised of steps of the Least Significant Bit (LSB) from point 0 to 65535 on Channel 1.

We also implement the TrueArb function that allows you to specify the sample rate and also ensures that each sample is sourced.

NOTE: You will need to change the instrument ID to match your specific instrument. We also recommend setting the amplitude and other instrument parameters prior to enaling the output of the instrument.

This example can also be altered for use with SDG1032X units by changing the waveform data to match the 14-bit data depth. 14 bits is 0 to 16,384 in decimal notation which is -8192 to 8192 in 2s complement.. in hex this is 0Xe000 (-8192) to 0x2000 (8192).

Here is pic of the instrument after loading the waveform:

Here is a scope shot of the output:

Here is a link to a Zipped version of the .PY file: SiglentSDG16BBitSteps

Here is the text of the program:

```python
#USB resource of Device
rm = visa.ResourceManager()
device = rm.open_resource('USB0::0xF4EC::0x1101::SDG6XBAQ1R0071::INSTR')

#Little endian, 16-bit 2's complement
#create a waveform

wave_points = []
for pt in range(0x8000, 0xffff, 1):
    wave_points.append(pt)
wave_points.append(0xffff)
for pt in range(0x0000, 0x7fff, 1):
```

```python
        wave_points.append(pt)

def create_wave_file():
    """create a file"""
    f = open("wave1.bin", "wb")
    for a in wave_points:
        b = hex(a)
        #print 'wave_points: ',a,b
        b = b[2:]
        len_b = len(b)
        if (0 == len_b):
            b = '0000'
        elif (1 == len_b):
            b = '000' + b
        elif (2 == len_b):
            b = '00' + b
        elif (3 == len_b):
            b = '0' + b
        b = b[2:4] + b[:2] #change big-endian to little-endian
        c = binascii.a2b_hex(b) #Hexadecimal integer to ASCii encoded string
        f.write(c)
    f.close()

def send_wave_data(dev):
    """send wave1.bin to the device"""
    f = open("wave1.bin", "rb") #wave1.bin is the waveform to be sent
    data = f.read()
    print ('write bytes:',len(data))
    dev.write_raw("C1:WVDT
WVNM,wave1,FREQ,2000.0,TYPE,8,AMPL,4.0,OFST,0.0,PHASE,0.0,WAVEDATA,%s" % (data))
    #"X" series (SDG1000X/SDG2000X/SDG6000X/X-E)
    dev.write("C1:ARWV NAME,wave1")
    f.close()

if __name__ == '__main__':
    """"""""
    create_wave_file()
    send_wave_data(device)
    device.write("C1:SRATE MODE,TARB,VALUE,333333,INTER,LINE") #Use TrueArb and
fixed sample rate to play every point
```

SIGLENT

North American Headquarters

SIGLENT Technologies NA
6557 Cochran Rd Solon, Ohio 44139
Tel: 440-398-5800
Toll Free:877-515-5551
Fax: 440-399-1211
info@siglent.com
www.siglentamerica.com/

European Sales Offices

SIGLENT TECHNOLOGIES GERMANY GmbH
Staetzlinger Str. 70
86165 Augsburg, Germany
Tel: +49(0)-821-666 0 111 0
Fax: +49(0)-821-666 0 111 22
info-eu@siglent.com
www.siglenteu.com

Asian Headquarters

SIGLENT TECHNOLOGIES CO., LTD.
Blog No.4 & No.5, Antongda Industrial Zone,
3rd Liuxian Road, Bao'an District,
Shenzhen, 518101, China.
Tel:+ 86 755 3661 5186
Fax:+ 86 755 3359 1582
sales@siglent.com
www.siglent.com/ens