Fast (Deep) Capture of IQ Vector Waveform Data from X-Series Signal Analyzers using MATLAB®

Revision Date: April 16, 2013

Overview

This lab example utility program demonstrates how to capture up to 2GB (512 Mega Samples) of I/Q waveform data from an X-Series Signal Analyzer. Software revision A.11.02 or later is required, since the Fast Capture (FCAP) command to extract the full 2 GB of data from the IQ Analyzer mode was added in A.11.02 software. Previously, the FCAP command was only included in the VXA measurement application. Option DP2 (or B1X, or B1Y or B40 or MPB) is required to enable the 2 GB memory capture in X-Series Analyzers. This example can either be run using MATLAB running inside an X-Series Analyzer or MATLAB running on an external PC and connected to the Analyzer via LAN, USB or GPIB. This example uses VISA instrument control libraries. For simplicity, the steps to run this example program demonstrate VISA using the Agilent IO Suite libraries.

Equipment Required for this Example Program:

a) Agilent X-Series Signal Analyzer (PXA, MXA, EXA) with at least one of the following options: DP2, B40, B1X, B1Y, or MPB

b) MATLAB 2010a or later installed on PC or on X-Series Analyzer

c) If Using external PC, a LAN, USB or GPIB cable are needed to connect the PC to the X-Series Analyzer

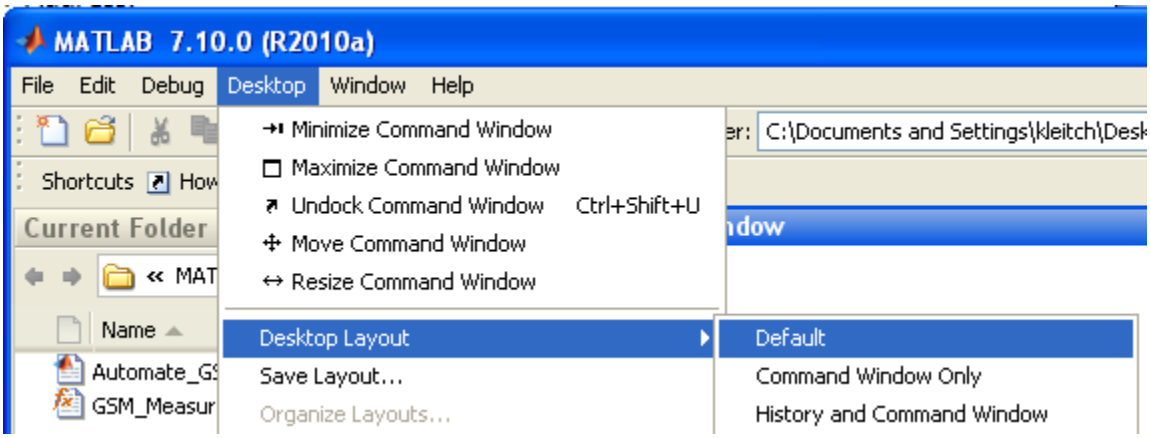
d) Agilent IO Suite version 14.0 or later

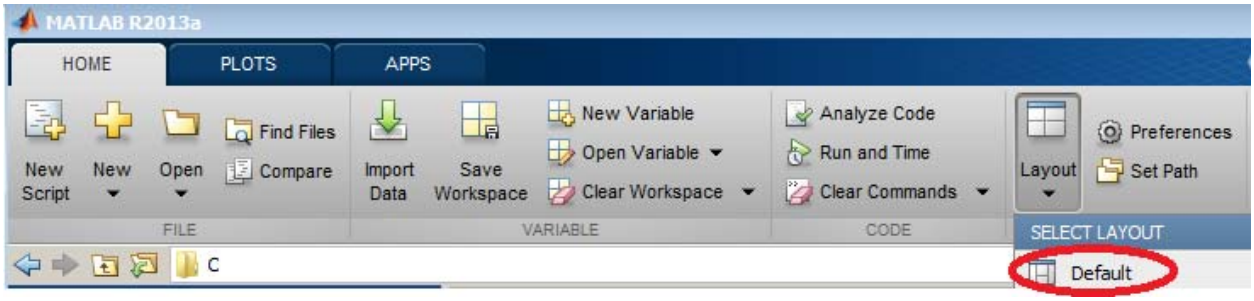
Step 1 – Connect Analyzer to LAN (if MATLAB is on an external PC)

a. To find the IP address of the Signal Analyzer, press [System] <Show> <LXI>
PXA/EXA/MXA IP Address: _____

Step 3 – Open MATLAB

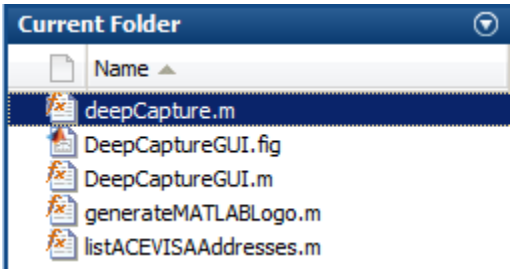
a. Open MATLAB and Restore the Default Desktop Layout





b. Navigate to the folder containing this lab

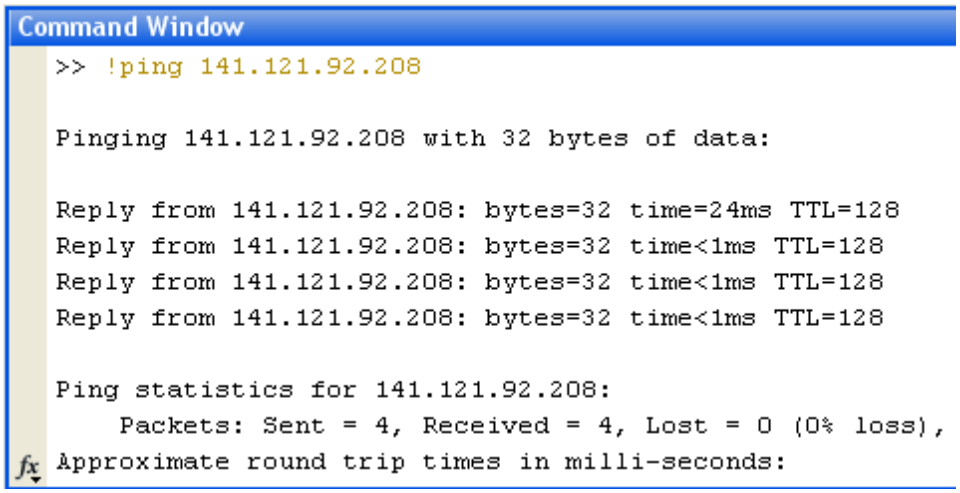
c. Double-click on deepCapture.m to be able to view the code for this example function



Step 4 – Double Check that you can communicate to your instruments

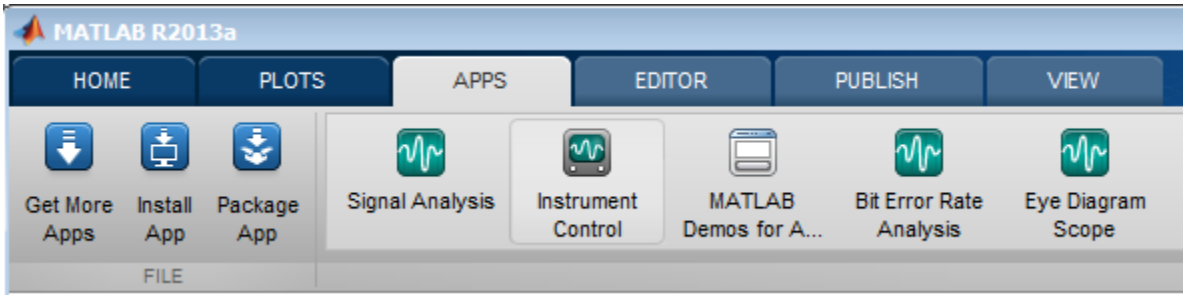
From the Command Window in MATLAB type you can test to make sure your instrument can be reached via LAN by using the Ping utility provided with Windows. To execute system commands from the MATLAB prompt, one can use the bang(!) operator.

At the MATLAB prompt type: !Ping <I.P. Address> and press Enter.

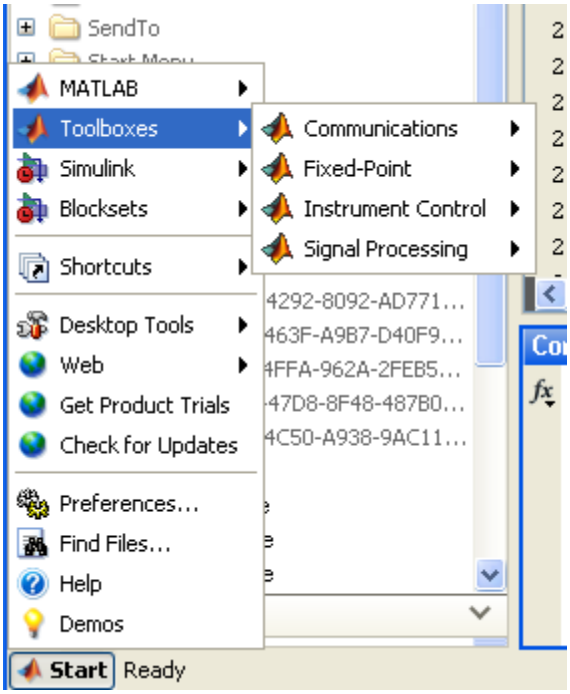


Step 5 – Double Check that your version of MATLAB has the Instrument Control Toolbox

a. In MATLAB 2012b and later, the Instrument Control Toobox is under the Apps tab:

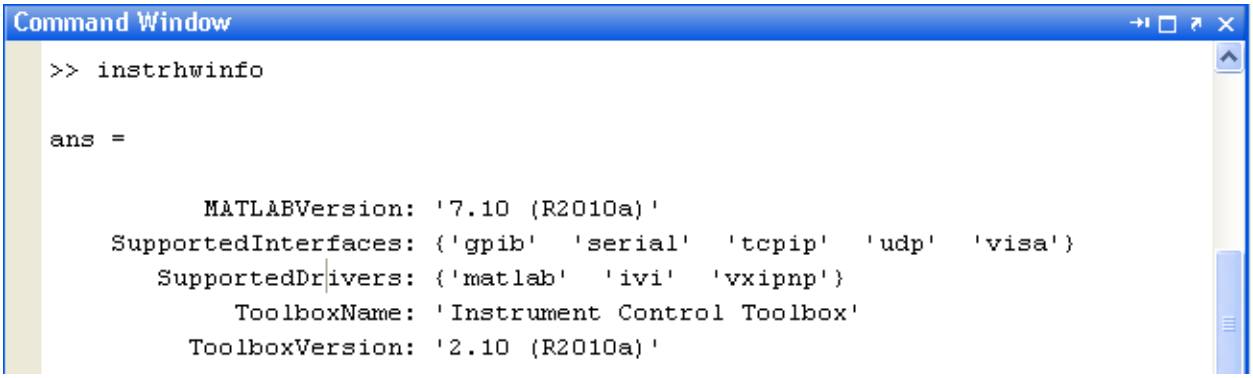


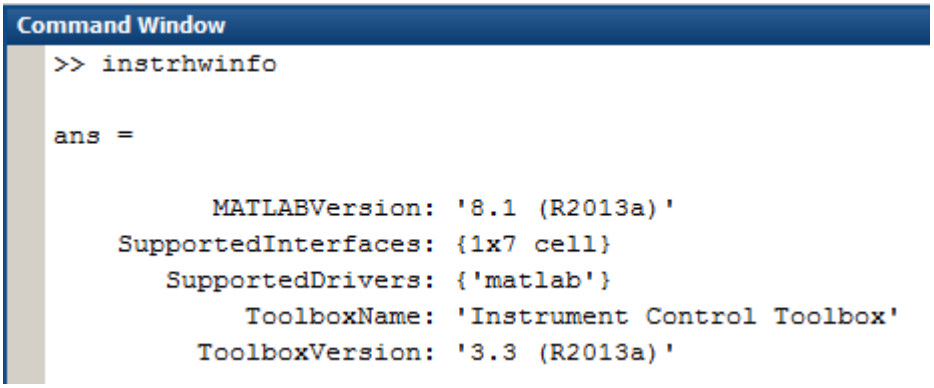
b. In prior versions of MATLAB, click on the Start button in the lower left corner of the MATLAB window and scroll up to Toolboxes. You should see the Toolbox “Instrument Control” listed.



Step 6 – Discover the available hardware to MATLAB on your PC

Type “instrhwinfo” from the Command Window



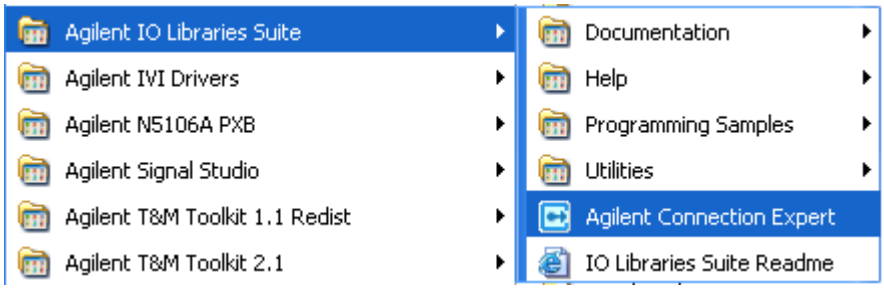


Step 7 – Map Instruments in Agilent IO Libraries Suite

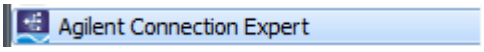
a. Open the Agilent Connection Expert either by double clicking the IO button  or  in your PC's task tray at the bottom right of the screen,

or by right click on the IO button and clicking "Agilent Connection Expert"

or by going to Start -> All Programs -> Agilent IO Libraries Suite -> Agilent Connection Expert



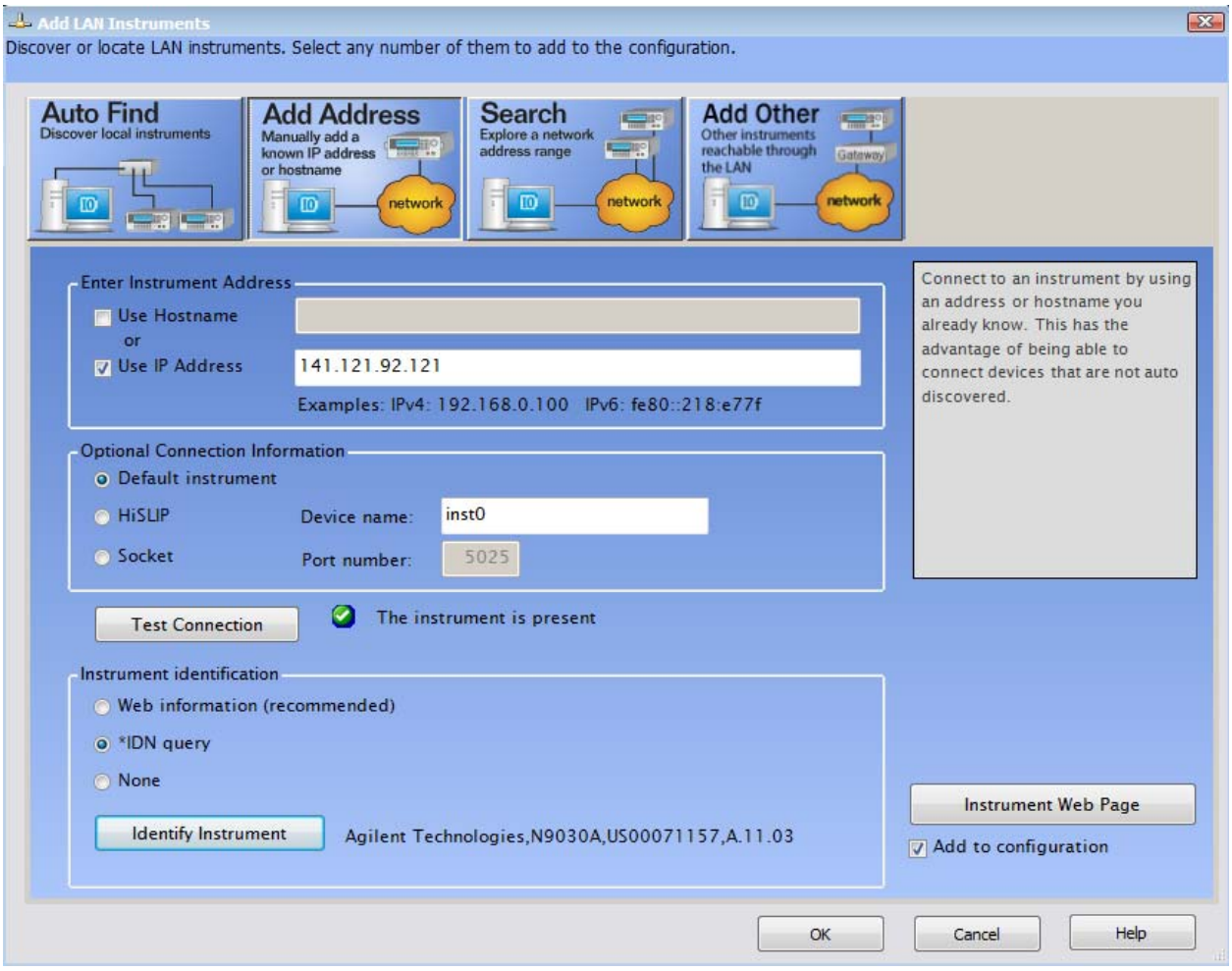
Or by going to Start -> All Program -> Agilent Connection Expert

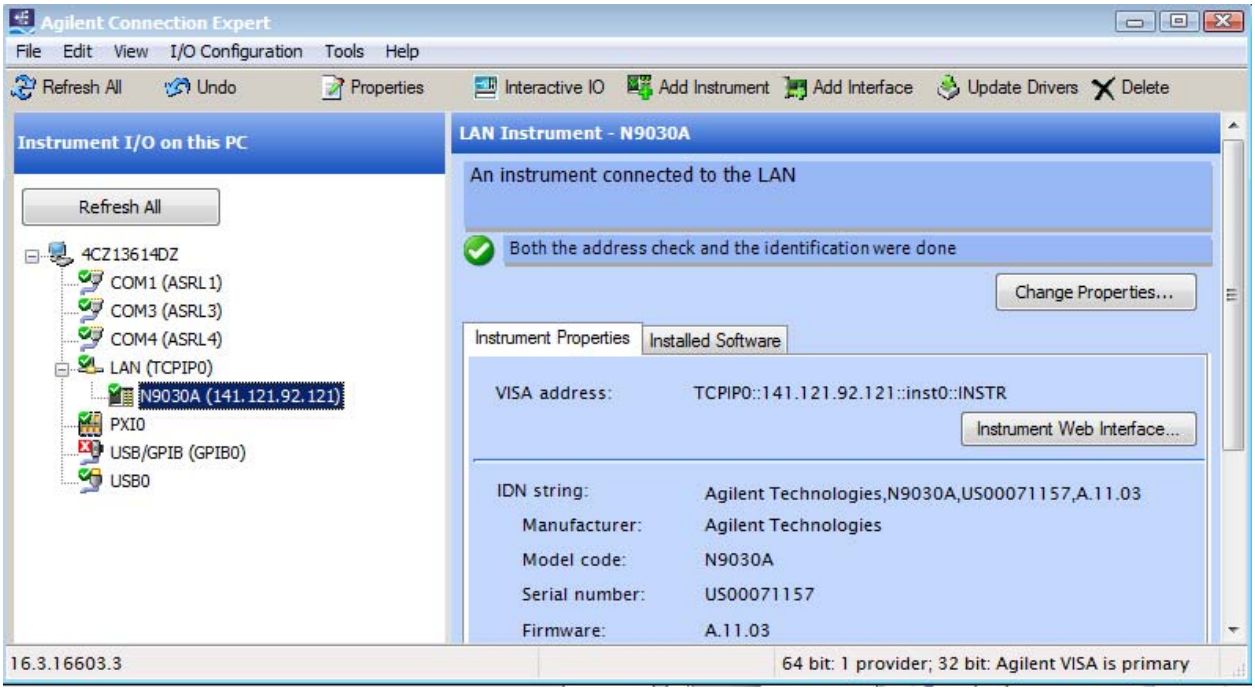


b. Add your X-Series Analyzer to the list of LAN instruments configured in Agilent Connection Expert. Click LAN and then click Add Instrument and then Add Address.

Make sure when adding a LAN instrument that the "Add to configuration" check box is checked.

(Note: if you are running MATLAB installed on the instrument, then you do not need to do this. The instrument is already listed as a LAN instrument using the local host address of 127.0.0.1

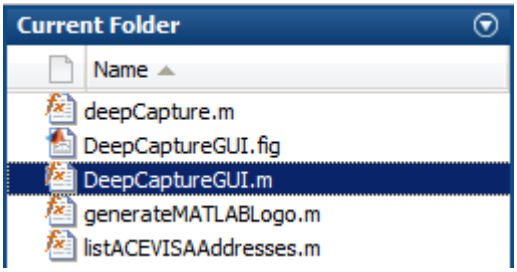

Add LAN Instruments
Discover or locate LAN instruments. Select any number of them to add to the configuration.
Auto Find
Discover local instruments
Add Address
Manually add a known IP address or hostname
network
Search
Explore a network address range
network
Add Other
Other instruments reachable through the LAN
Gateway
network
Enter Instrument Address
Use Hostname
or
Use IP Address
141.121.92.121
Examples: IPv4: 192.168.0.100 IPv6: fe80::218:e77f
Connect to an instrument by using an address or hostname you already know. This has the advantage of being able to connect devices that are not auto discovered.
Optional Connection Information
Default instrument
HiSLIP
Device name:
inst0
Socket
Port number:
5025
Test Connection
The instrument is present
Instrument identification
Web information (recommended)
*IDN query
None
Identify Instrument
Agilent Technologies,N9030A,US00071157,A.11.03
Instrument Web Page
Add to configuration
OK
Cancel
Help


Agilent Connection Expert
File Edit View I/O Configuration Tools Help
Refresh All
Undo
Properties
Interactive IO
Add Instrument
Add Interface
Update Drivers
Delete
Instrument I/O on this PC
Refresh All
4CZ13614DZ
COM1 (ASRL1)
COM3 (ASRL3)
COM4 (ASRL4)
LAN (TCPIP0)
N9030A (141.121.92.121)
PXI0
USB/GPIB (GPIB0)
USB0
LAN Instrument - N9030A
An instrument connected to the LAN
Both the address check and the identification were done
Change Properties...
Instrument Properties
Installed Software
VISA address:
TCPIP0::141.121.92.121::inst0::INSTR
Instrument Web Interface...
IDN string:
Agilent Technologies,N9030A,US00071157,A.11.03
Manufacturer:
Agilent Technologies
Model code:
N9030A
Serial number:
US00071157
Firmware:
A.11.03
16.3.16603.3
64 bit: 1 provider; 32 bit: Agilent VISA is primary

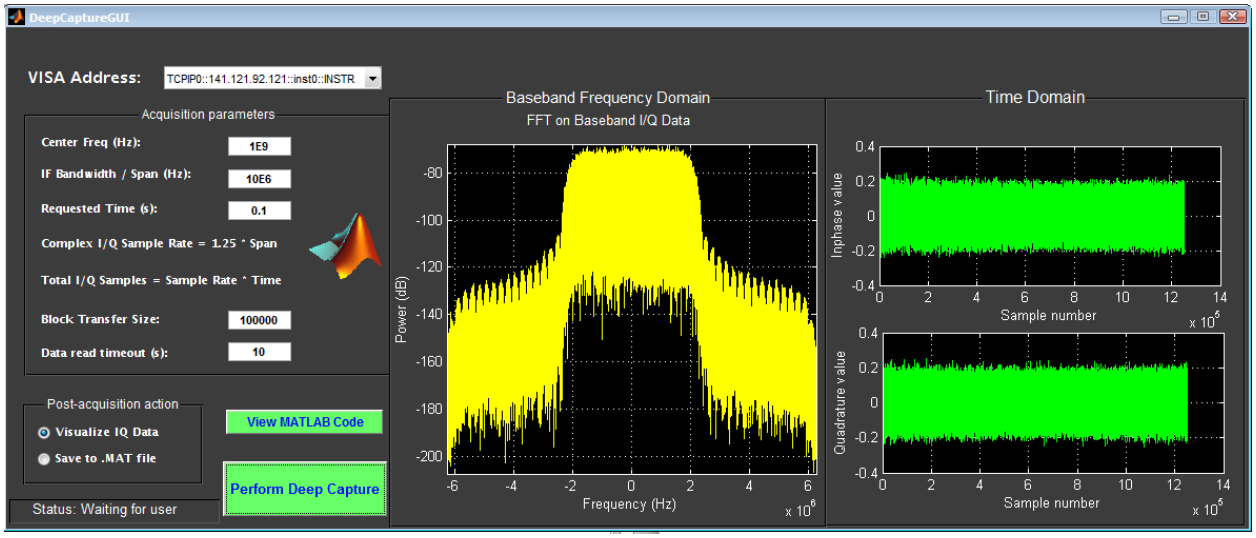
Step 8 – Start Evaluating/Executing the Code in the Program.

a. You can execute MATLAB scripts using one of the many possible ways. Typing in the name of the script, or right-clicking on the script in your MATLAB current directory browser and selecting "Run" will execute the commands in the script.

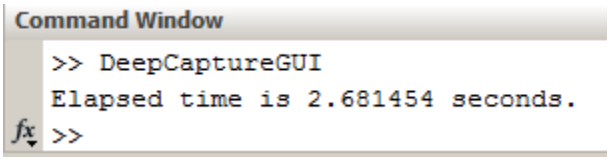
b. Click on DeepCaptureGUI.m and press F9 to run



c. When the Deep Capture GUI appears press “Perform Deep Capture”



d. The command window will show you how long it took to perform the capture



e. You can also save the captured data to a .MAT file, and you can change the bandwidth and time. Note: You usually would not change the Block transfer size, unless you were trying to optimize transfer speed time.