Digitizer's Manual

Step-by-step procedure(s) to programme IP's, to download bitstream to digitizer card(s), and to run the internal noise test

General operations:

- Change IP if required
- Run FPGA to program CORE and SEGMENTS using XPORTs
- Test internal noise of individual CORE and SEGMENTS – submit the report

In case of questions, contact - Pushpendra P. Singh at 0615971-2180 (GSI local) or email to p.p.singh@gsi.de

A. To program digitizers IPs:

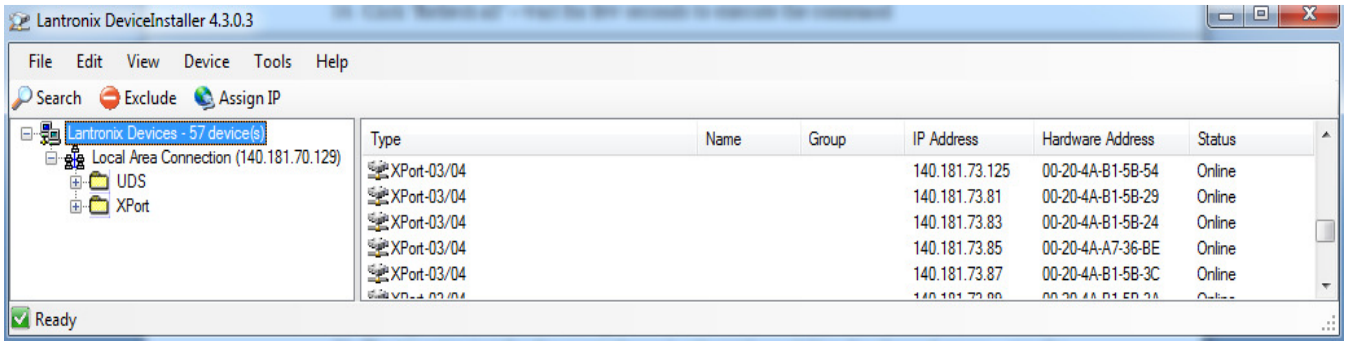
1. Firmware is available at http://ltxfaq.custhelp.com/app/answers/detail/a_id/644
   NB: Download "stand alone DeviceInstaller". This can be installed on a window computer.
   System requirements – Windows XP or Windows7, Java JRE version 1.6 or later (available at Java web site, please select Java Runtime Environment JRE1.6), Screen resolution 1024x768, at least 1 GB of RAM, Microsoft .NET Framework 4

Product	**Download via FTP**	**Download via HTTP**	Comment
Stand-alone DeviceInstaller Setup application for Windows (70 MB)	FTP	HTTP	No internet access required to install

2. After installation change the machine to the local network (i.e., 10.10.30.250 – core card, and/or 10.10.31.250 – segment card
   (NB– this operation should be performed on local network only) – details of local network at GSI are following;
   Local network – IP 10.10.30.250
   Subset mask – 255.0.0.0
   Default gateway – 0.0.0.0

3. Plug the network cable in the CORE of digitizer.

4. Run the DeviceInstaller as administrator – it should show a window as given below



5. Click on SEARCH on Lantronix device installer – it shows the IP address of core (e.g., 10.0.1.14 (here – 14 is digitizer's id) and MAC address (it's better to note MAC addresses of CORE and SEGMENTS).

6. open XPORT menu (click on +) - click on IP address (i.e., 10.0.1.14) - click on **assign IP** – click on **assign a specific IP address** – click **NEXT** (it opens IP settings).

7. Now change IP from 10.0.1.14 to 10.10.30.14 (as mentioned above, 14 is the digitizer's id, 30 is the CORE device id) – click **NEXT**.
8. Click Assign – progress of task - finish – successfully change the IP

Same operation should be performed to change the IP of SEGMENTS. However, following changes are must;

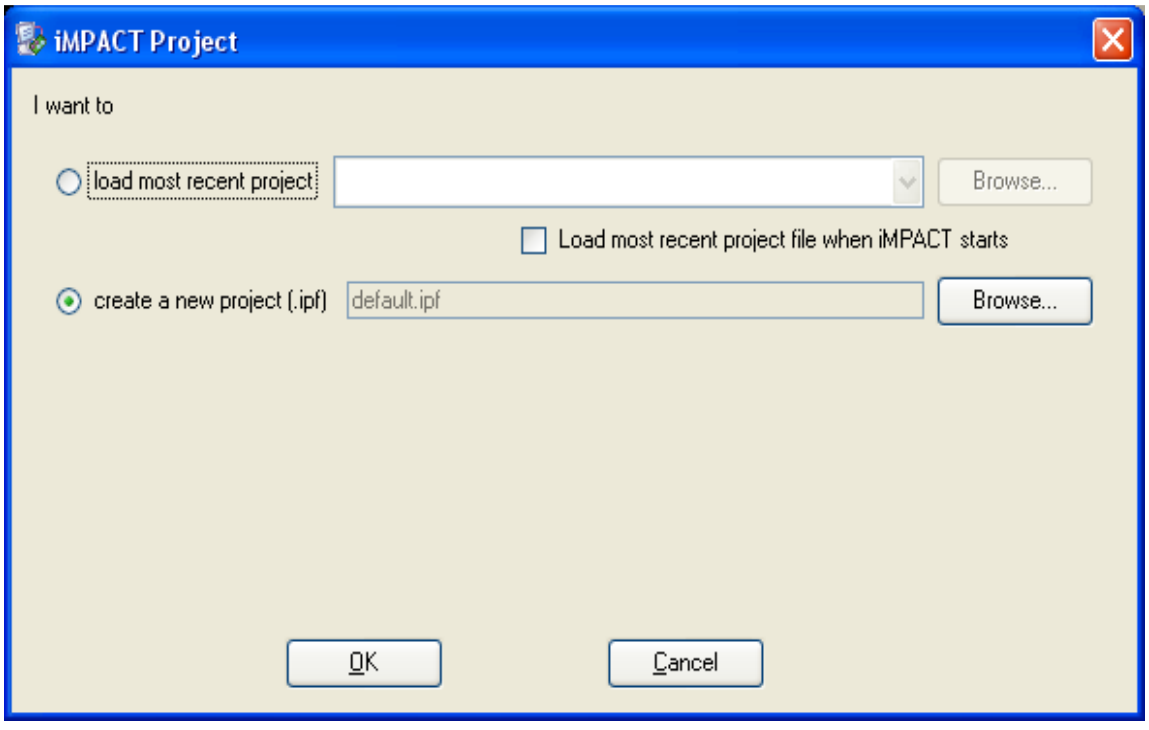
- Plug the network cable into the SEGMENTS
- Change the SEGMENT device id as 31 (for example – 10.10.31.14, for the segments of digitizer 14)

B.Test of internal noise of Digitizers:
(i) Download Bitstream to Digitiser Card

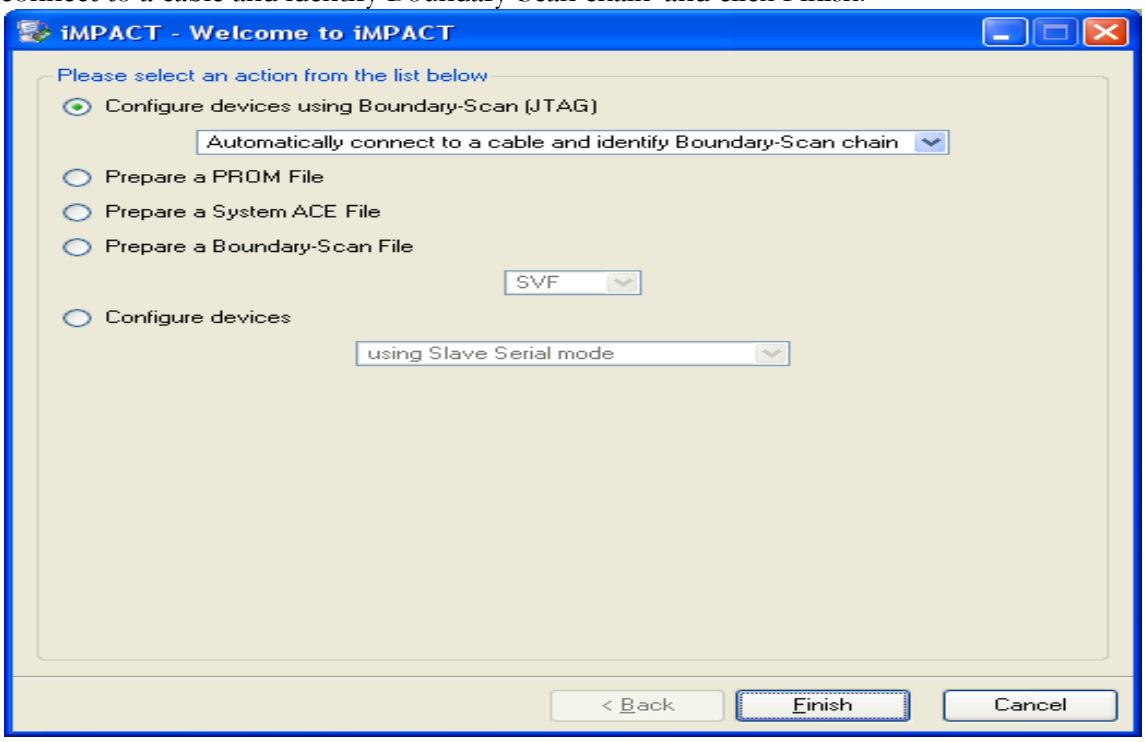
1. You will need Xilinx Impact software tool and the Xilinx USB programmer.
   (Download from: http://www.xilinx.com/support/download/index.htm)

2. Connect Xilinx USB programmer to the JTAG connector of one of the digitiser cards (at the back of the digitiser).

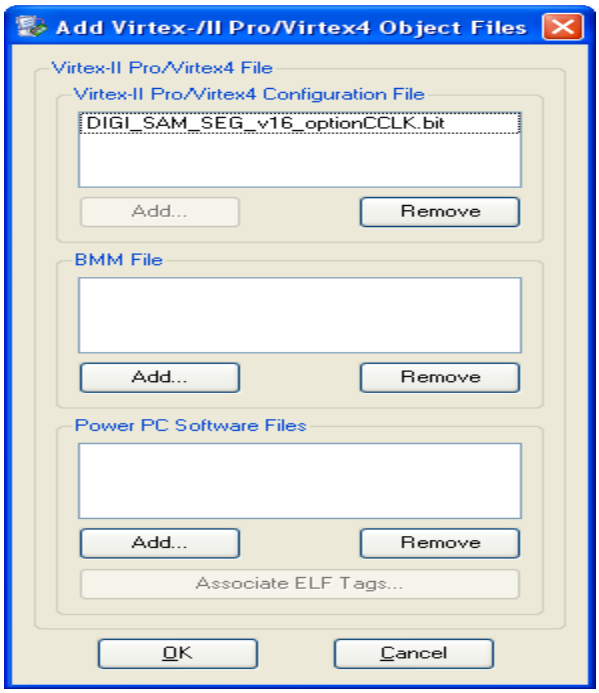
3. Run Impact , choose "create new project" and click ok:



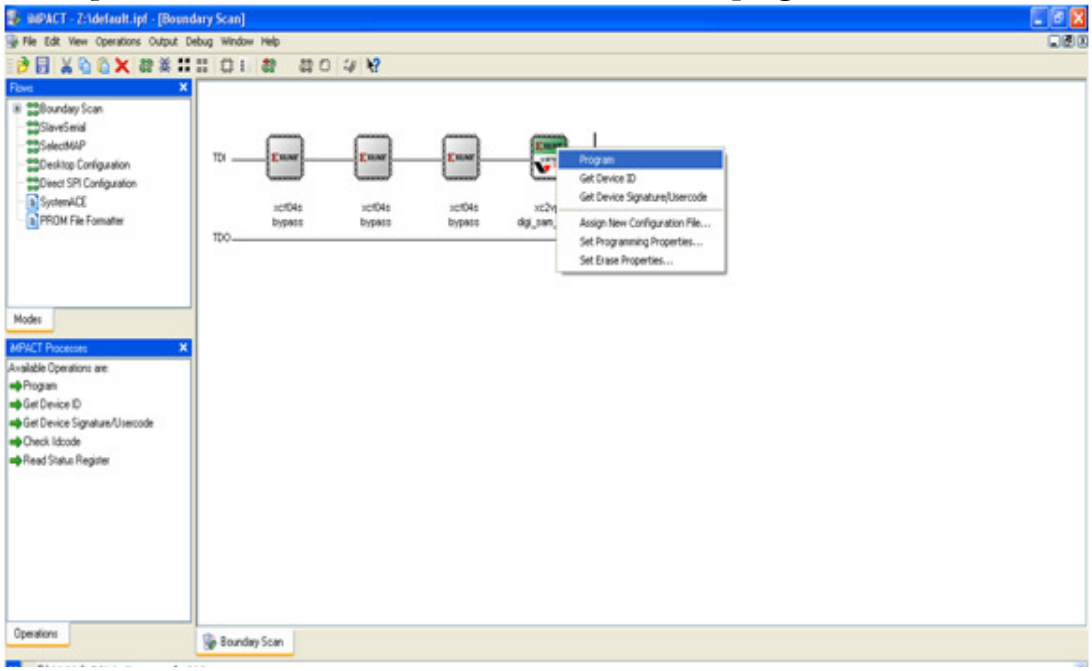
4. Leave setting as "Configure devices using Boundary-Scan (JTAG) – Automatically connect to a cable and identify Boundary-Scan chain"and click Finish.



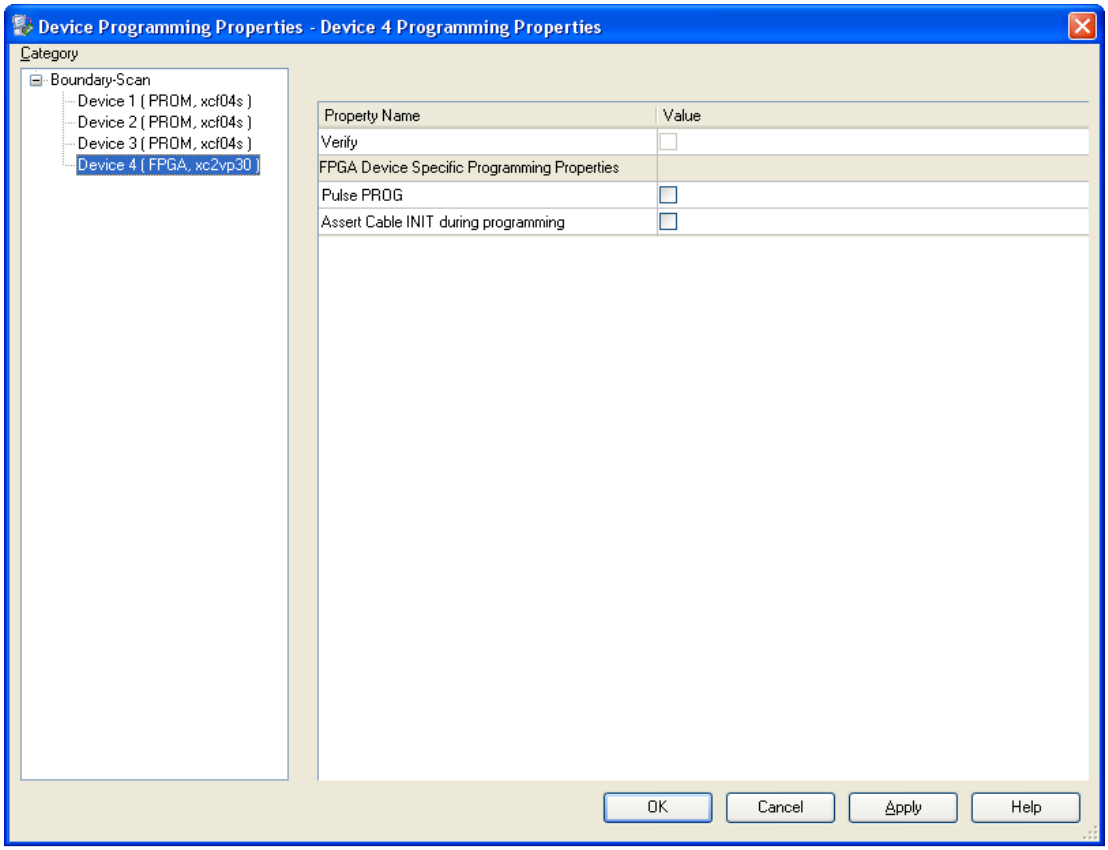
5. Bypass first 3 chips (platform flashes) in the JTAG chain. On the 4th one (the FPGA itself), choose the appropriate file (i.e DIGI_SAM_CORE_v5_optionCCLK.bit for the CORE card and DIGI_SAM_SEG_v16_optionCCLK.bit for all the SEGMENTS cards).



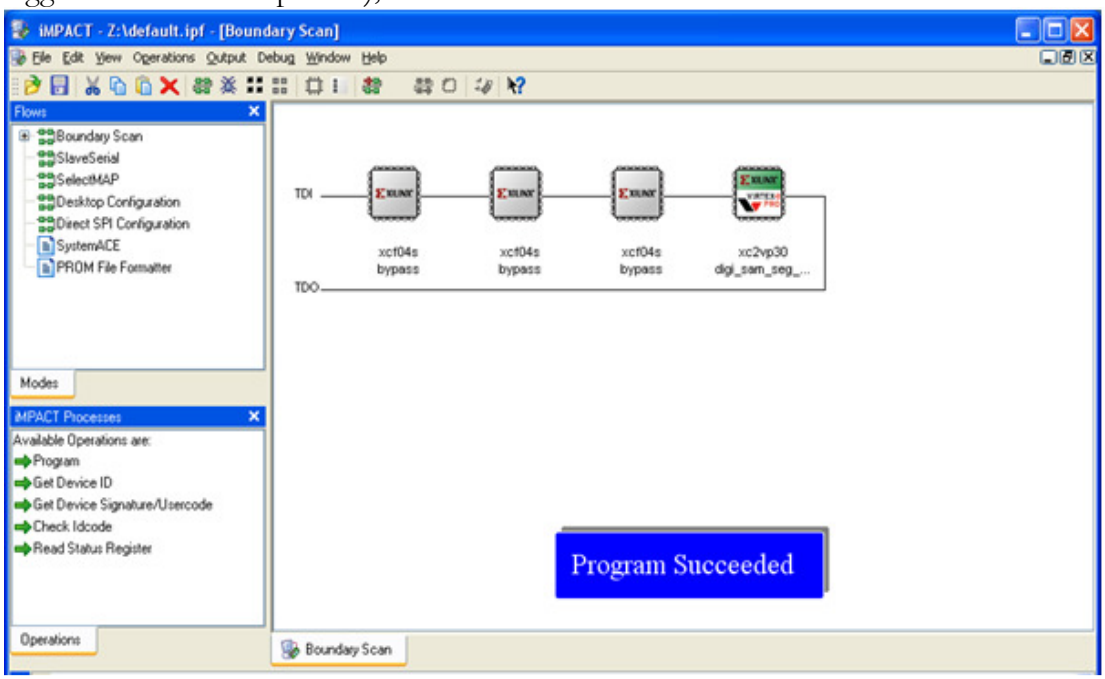
6. Then right click on the FPGA icon on the chain and select **program.**



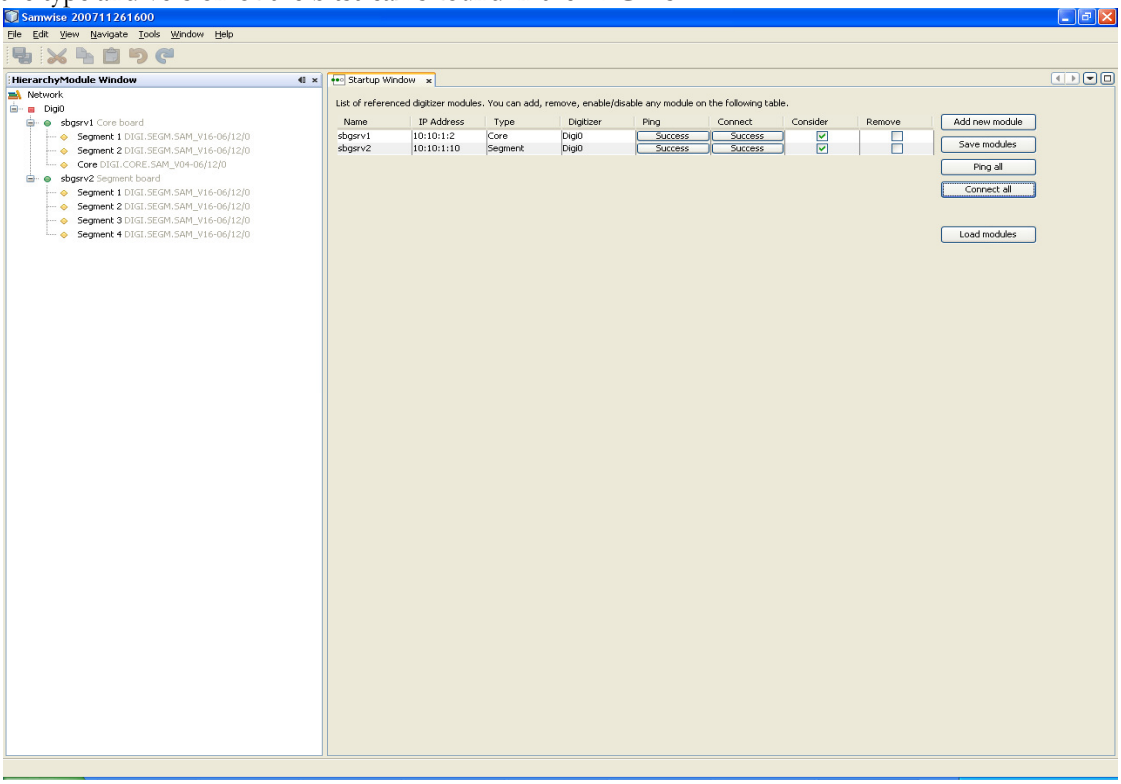
7. Make sure that Device 4 (FPGA, ...) is selected and click apply /ok.



8. If successful - you will get the following (and the LEDs at the back of the card will toggle in an even-odd pattern);



9. Repeat the procedure for the rest of the digitiser cards.
   (Make sure to download DIGI_SAM_CORE_v5_optionCCLK.bit for the CORE card and DIGI_SAM_SEG_v16_optionCCLK.bit for all the SEGMENT cards)
10. Another way to check that the correct bitstreams are loaded in the FPGA's is to – check the SAMWISE once you have connected. In the snapshot below, left handside, samwise reports the type and version of the bitstreams found in the FPGA's.

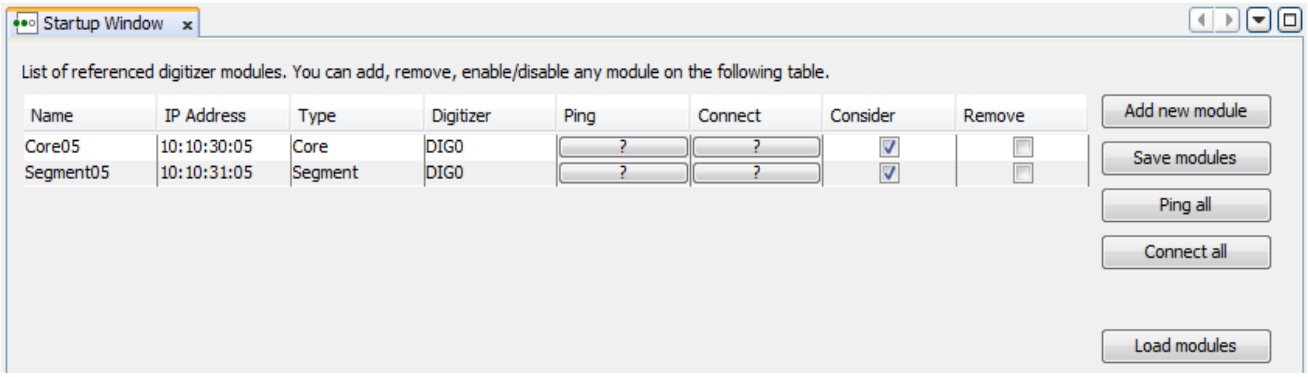


Now the Digitizers are ready to run noise test – follow the forth given steps to run internal noise test

(ii) ***Steps to run internal noise test.***

1. Firmware is available at http://www.iphc.cnrs.fr/article/samwise.html
   System requirements – Windows 2000 or Windows XP, Windows7 (not tested on other platforms), Java JRE version 1.5 or 1.6 (available at Java web site, please select Java Runtime Environment JRE1.6), Screen resolution 1024x768, minimum 1 GB of RAM, Microsoft .NET Framework 4
   If some abnormal termination (crash), any further startup can block showing some error message. In this case, it is necessary to remove/delete the whole "samwise" directory.

2. Run SAMWISE as administrator, it should show the "Startup Window" as given below



3. Edit the IP address (if not the same as assigned by 'DeviceInstaller'), i.e., 10.10.30.14 (CORE) and 10.10.31.14 (SEGMENTS) *(here, unit id 14 is used as an example)*
4. Click 'Ping' one by one for both CORE and SEGMENTS – it should show 'success' in the same column for both CORE and SEGMENTS
5. Click 'Save modules' - Click 'Connect all' – it should show up 'success' in 'Connect' column and also in 'HierarchyModuleWindow'.
6. Click 'green tab to open' in 'HierarchyModuleWindow' – Right click on 'Digi0' – click show histograms - Click 'Test View' from different view tabs.
7. Select histogram type 'ADC'
8. Select the 'dir' location to save the noise report (e.g., E://(int_noise_digitizers)
9. Set the channel number one by one from the 'Channel' menu
   NB: it's better not to run noise test for all CORE and SEGMENTS at a time – select upto four channels in one go.
10. Click 'Run' for the selected CORE and SEGMENTS
    NB: spectrum viewer gives the freedom to zoom or un-zoom the spectrum – right click and select around the peaks to zoom
11. Repeat the same procedure for all channels
    Each unit has a spare channel, it's important to make noise test for spare channel too – this can be a life saver if some channel is not working properly
    The acceptable signal-to-noise ratio of a digitizer is more than 70, if less – the unit need to be replaced.
    Desired statistics for reliable signal-to-noise ratio is more than 300 events, which may need to run the test for almost 10 minutes.

(iii) ***To run the noise test for SPARE channel:***

For CORE module

12. Right click on 'DIG0' in 'HierarchyModuleWindow'
13. Click 'Refresh all' – wait for few seconds to execute the command
14. In 'CORE module' menu – select edited board 'SEGMENT1'
15. Select 'spare channel 1'
16. Click 'send to card'
17. Repeat the same for all Segments – and send to card

For SEGMENTS modules

18. Do the same operation for segments in 'SEGMENT module menu' and send to card
    NB: above operations are to modify the card to run noise test of spare channel
19. Now go back to 'DIG0 Histograms menu'
20. To run noise test for the spare channel, select 'channel 1' in the channel menu – run the noise test same as before
21. Now submit the noise test report – click **'Submit Noise Report'** **(must do)**