How to Interface NetSim with LabVIEW?

Software: NetSim Standard v13.0 (64 bit), Visual Studio 2019, LabVIEW 2020.

Project Download Link:
https://github.com/NetSim-TETCOS/NetSim-LabVIEW-Interfacing-v13.0/archive/refs/heads/main.zip

Follow the instructions specified in the following link to download and setup the Project in NetSim:

https://support.tetcos.com/en/support/solutions/articles/14000128666-downloading-and-setting-up-netsim-file-exchange-projects

Introduction

NetSim can be interfaced with LabVIEW, which allows users to interact with LabVIEW during run-time. LabVIEW can interact and control the behavior of its Models.

LabVIEW is a system engineering software for applications that require test, measurement, and control with rapid access to hardware and data insights. NetSim now has a method of Interfacing with LabVIEW in a fashion similar to that of MATLAB interfacing. NetSim can initialize a LabVIEW Virtual Instrument (.vi) file during runtime, pass inputs to components of the file, execute the vi, read the computed parameters from its components, and terminate the vi instance at the simulation end.

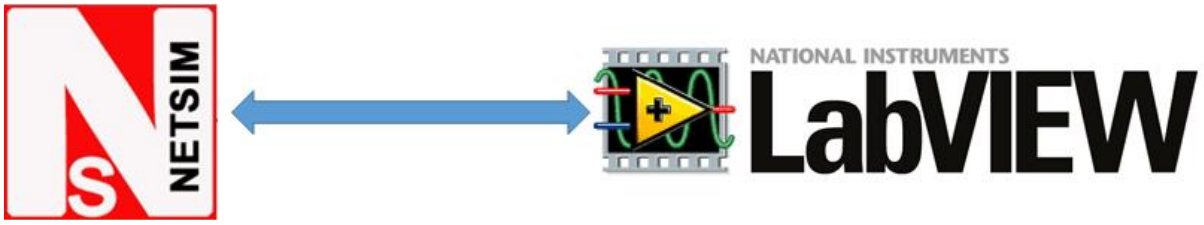

Figure 1: NetSim Interfacing with LabVIEW

LabVIEW Example

In this article, we have considered a simple LabVIEW Example which keeps generating a random number and passes periodically to NetSim during run-time.

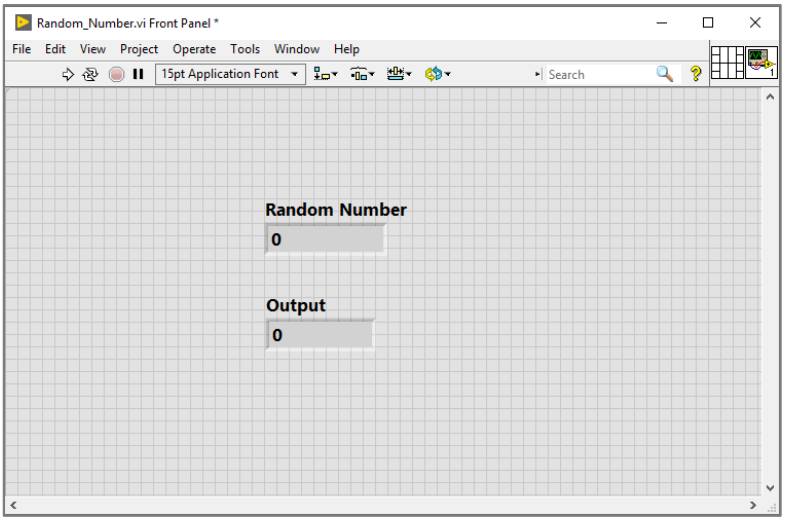

Figure 2: Random_Number.vi window

NetSim-LabVIEW interfacing

Upon interfacing NetSim with LabVIEW the following tasks are performed during simulation start:

- LabVIEW Engine process is initialized.
- LabVIEW GUI window is loaded.
- LabVIEW - Random Number generator Example is loaded.

Upon simulating a network created in NetSim the following tasks are performed periodically:

- The random number starts generating in LabVIEW.
- NetSim reads the data generated by LabVIEW.
- Prints the random number to NetSim Simulation window.

Output/Metrics specific to this example

- NetSim Event Trace - LabVIEW event is registered to periodically interact with LabVIEW.
- NetSim Run-time simulation

Modifications done to NetSim Source codes

Projects: Zigbee
Files:

- 802.15.4.c,
- 802.15.4.h,
- Zigbee.vcxproj (Project file)

Files added:

- Labview_Interface.cpp
- Labview_Interface.h

Steps to Simulate.

1. Open the Source codes in Visual Studio by going to Open Simulation-> Workspace Options and Clicking on Open code button as shown below:

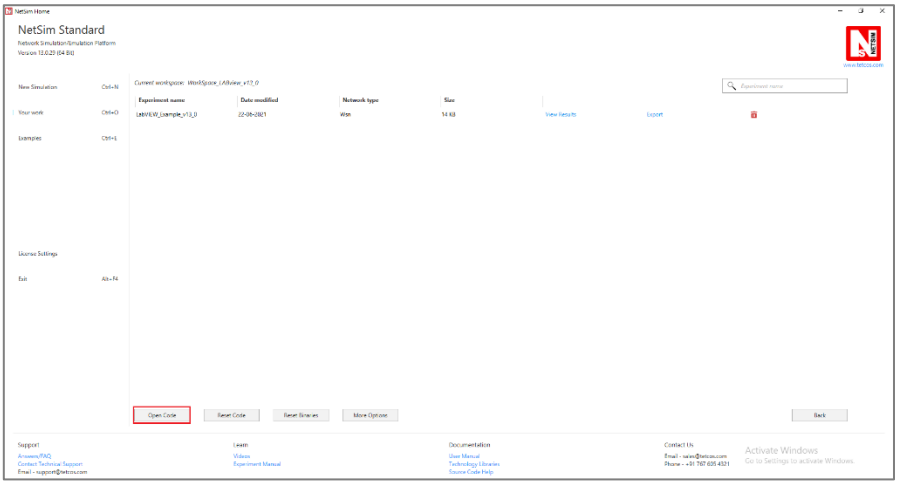

Figure 3: Open source code option in Your work window

2. In Solution explorer, you can observe, the battery model and Zigbee projects where LabVIEW_Interface.cpp and LabVIEW_Interface.h files are present inside Zigbee project which contains source code related to interactions between NetSim and LabVIEW.

3. Based on whether you are using NetSim 32 bit or 64 bit setup you can configure Visual studio to build 32 bit or 64 bit Dll files respectively as shown below:

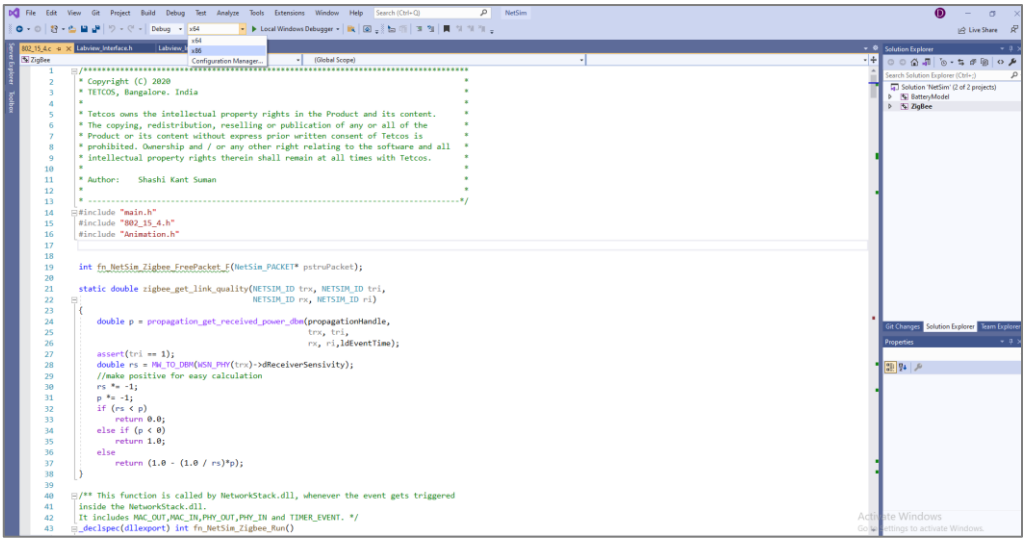

Figure 4: Based on the build of NetSim select Win32/x64 in Visual studio.

4. Change the Labview.tlb path as per your installation in Labview_interface.cpp file.

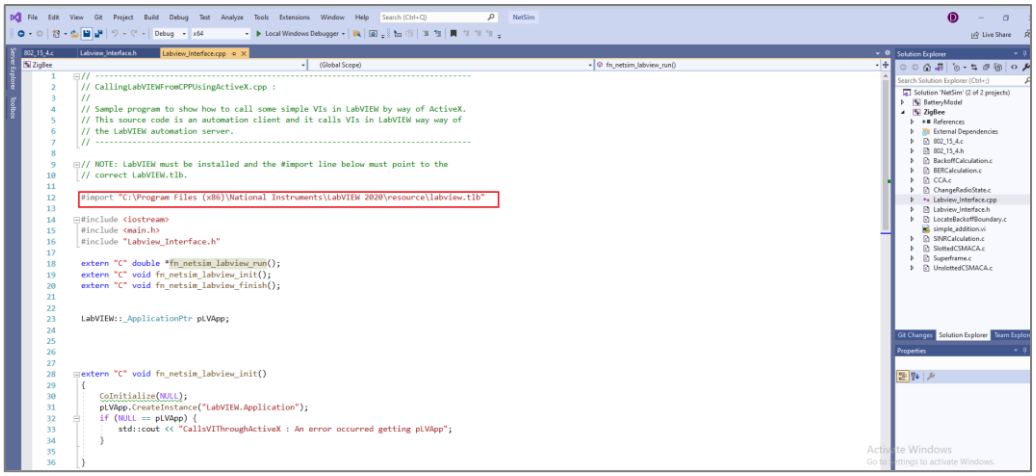

Figure 5: Adding LabVIEW.tlb path in LabVIEW_interface.cpp.

5. Right click on Zigbee project and click on Rebuild.

6. Copy the Random_Number.vi LabVIEW file which is present in LabVIEW file folder to "C:\Program Files (x86) \National Instruments\LabVIEW 2020\examples

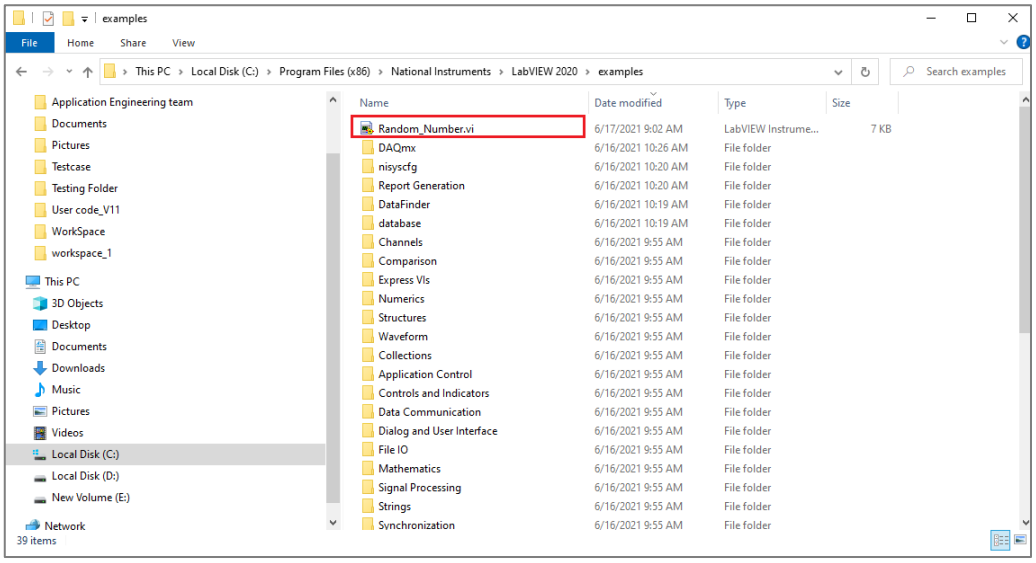

Figure 6: Copy Random_Number.vi in National Instruments\LabVIEW 2020\examples

7. To open this LabVIEW example, go to Open Simulation and click on the Example that is present under the list of experiments as shown below.

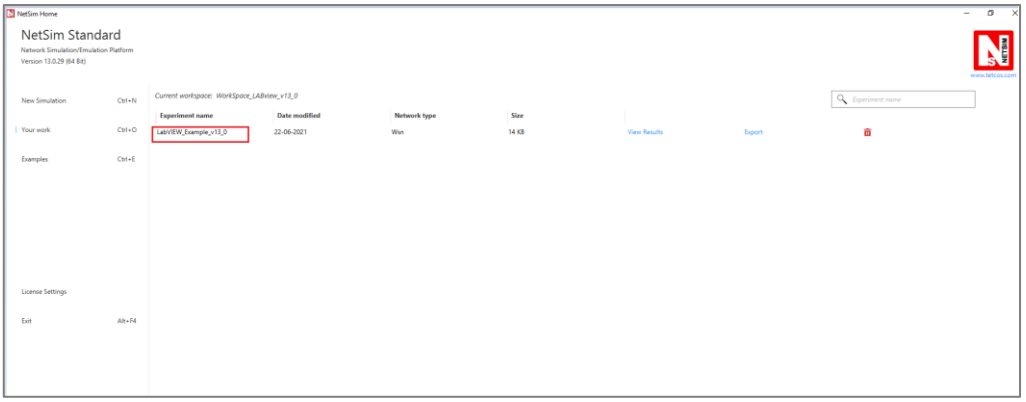

Figure 7: LabVIEW saved example in your work.

8. This opens a sample WSN network with sensors and WSN sink connected with Adhoc link, with traffic configured as shown below:

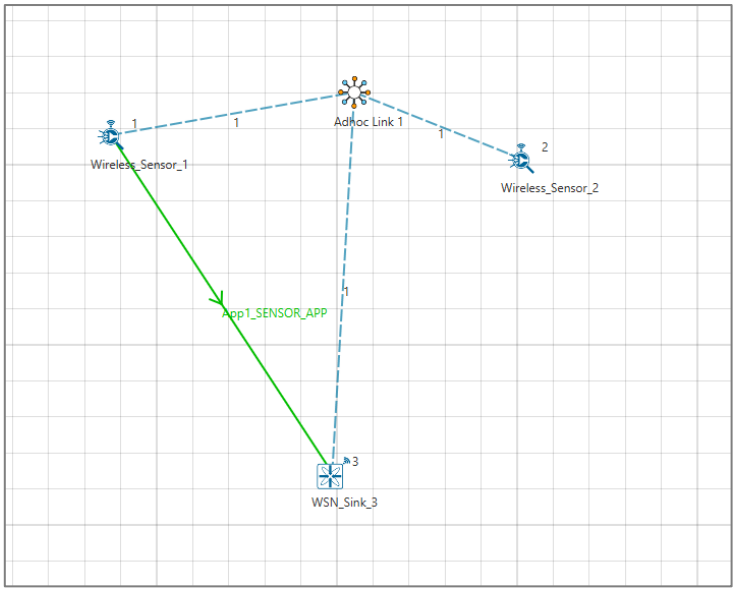

Figure 8 : WSN Scenario

9. Click on Run button and simulate the network scenario. NetSim simulation console waits for user interrupt to initialize a LabVIEW instance.

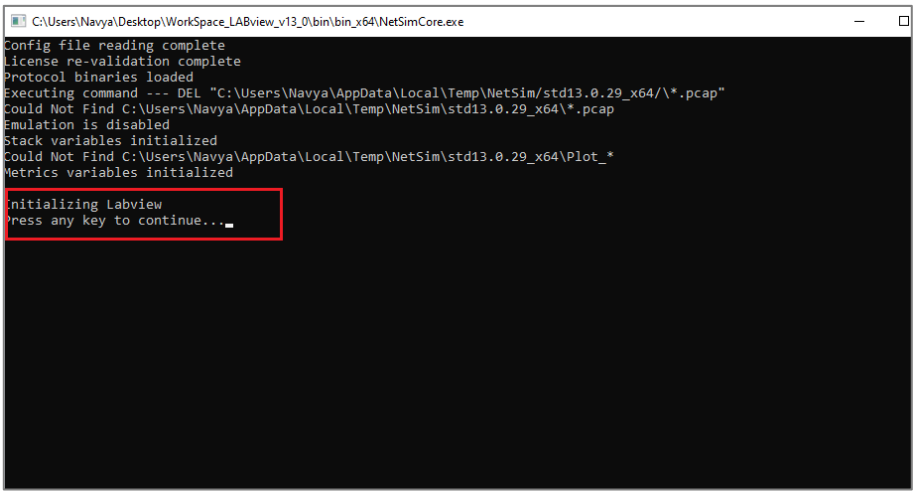

Figure 9: Initializing LabVIEW to Interface with NetSim.

10. As simulation starts, you will be able to observe that Random number generated in LabVIEW which is fetched by NetSim during runtime and also printed to the simulation console during Run time.

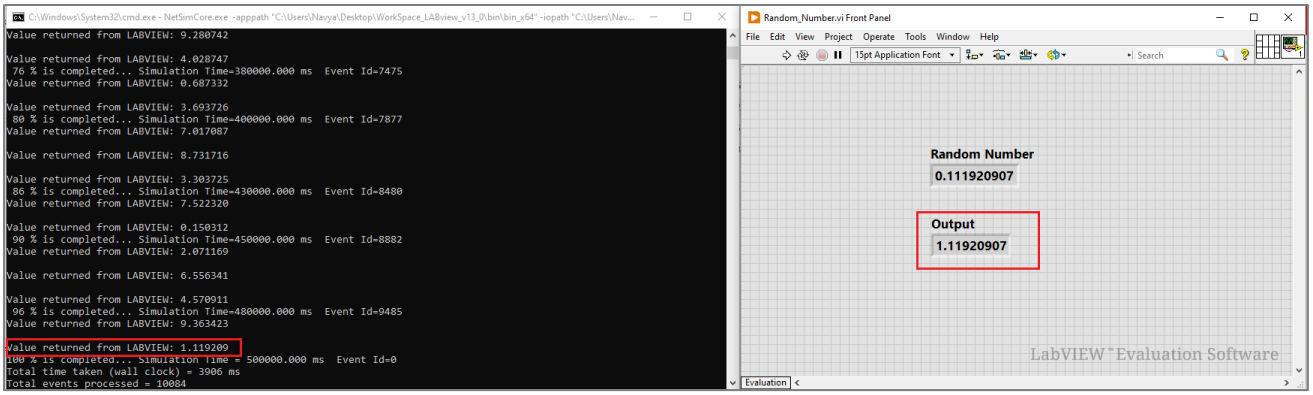

Figure 10 : Interaction between NetSim and LabVIEW