

Helpful Suggestions when using the Remote FPAA system

The remote FPAA system is a powerful tool enabling use of the FPAA infrastructure from anywhere without an FPAA board in hand. Even when the day you have an FPAA board always available, you will find cases where you will still want to use the FPAA board.

First, please make sure you know what chip type you are using. At this stage, all of the remote systems are using the RASP 3.0 FPAA IC; most of the class boards (one you have in hand) are using the RASP 3.0a. These two chips are slightly different, and the compiled code (switch lists) are not compatible, even though you can use the same Xcos / Scilab definitions. Please check to make sure you have the right board set, either **3.0 (e.g. for remote)** or 3.0a (e.g. board in hand).

One will have some issues with the overall tools in general. A complete block has both simulation capabilities, either level=1 (system simulation) or level=2 (circuit simulation), as well as will target to FPAA hardware. Unfortunately, not all blocks in the library have both capabilities, although eventually, they need to. Some current examples:

- The measure voltage block does not simulate.
- OTA_mod can be simulated, but not programmed, whereas the OTA block can be programmed, but not simulated.

After updating, you might find that a few of your blocks in xcos got updated as well. Unfortunately, xcos does not seem to know how to just replace updated blocks. Therefore, you should replace those blocks again in your xcos file. The demonstration files seem to work directly after updating. I'm sure in time, we will find better solutions to these issues.

At times we will provide additional information on a particular block; in the future, we hope to have full documentation on the entire library. One important example:

- The arbgen block allows for an arbitrary waveform generation based on vector (or a vector of vectors if using a bus instead of wires). It also has the capability to continuously keep playing the input vector; after reaching the last data sample, it returns to the first data sample. Unfortunately, this feature is not useful for remote systems, and has the capability to hang the system. Therefore, for all of your measurements using the remote system using Arbgen block, Loopback should be set to NO ("N"). It currently defaults to YES. I can not think of a reason where someone in the class needs to set Loopback to on.

Remember you are using a real physical system. The power supply is at 0V and 2.5V. You should not have any voltages being sent that are outside of these bounds. It might sound obvious, but it is one of the most common errors we see.

Please make sure you know **your circuits would require biases**. Putting a signal say as *a step from 0 to 0.1V* will most likely not be in the operating range of your circuit, as well

will slow down the resulting system measurements (DACs, ADCs) in that range. If we see repeated issues, we have the right to delete a particular job.

Please do not take large datasets unless absolutely necessary (and you know your smaller dataset already works). I realize you might be tempted to do a fine sweep, say of a common-source or OTA amplifier by just defining 3000 data points to the remote system (for a slow ramp) and let it run. Unfortunately, if everyone does that, the system will take quite awhile to finish its measurements. In practice, whether for a remote board or if you physically have a board is to perform two sweeps: one that spans the entire range (say with 100-128 data points), and then take another sweep in the region you are investigating (e.g. the high gain region). That will enable you to get good data on your target region.

Don't rename or unzip the results.zip. Overwrite every time. You are welcome to make a copy and look at the data, but keep the same procedure for results.zip. Some will access their email, by whatever means are comfortable to them, in the virtual machine to speed up the process.

Suggestions are welcome.

A few issues using the Xcos system:

- Hit enter after every text input field
- Please use either chip 01 or 13. Chip 15 does not exist.

Please utilize the on-line documents, particularly documents posted for the class. We have a lot of documentation on-line, and have created it to improve your user experience. Suggestions of future documentation is welcome; how fast we can create such materials is a different question (although we will try). Project 1 had a "setting up" document for remote system usage, since that was the first place you needed the material. Other technical data, like information for sims / measurements for the second project are also in documents posted. For class, remember that one paper is posted on T-square that discusses simulation (including some aspects from Proj 1 and 2).

Please remember if using arbggen that you need to define you're myVariable (or what ever you named it). The Variable requires the same size vectorization as your actual signal lines. You will have a vector of signals

Also, if someone in the class sends 15 emails at once, it will take awhile for the system to program and send back the results, keeping others from being able to use the system. If we see such behavior going forward, we reserve the right to kill most of the submissions. Please be respectful of others using the system.

Remember the remote system might run into security issues (being that we use gmail) when sending to certain less secure email systems (e.g. gatech.edu). You run the risk you won't get your results back.

Be careful about creating folders that you intend to use through scilab that require special characters. After all, things are in Linux. Therefore, defining a folder as “Project2” would be good, but defining a folder as “Project 2” will introduce a special character due to the space (and having slashes required).

You might find useful to access your email by a web browser right in the VM so you can download the results from your remote computation.

Further, just some common things that we have noticed interacting with student questions:

- Update the Tools, let it shut down, then Reset the Tools using the built-in reset function in the same drop down menu, and let it shut down again. Make sure not to interrupt the process, let the program run its course and it should shut down for you.
- Use a linspace for your arbggen variable. It's recommended to simply create a new variable and name it something appropriate, such as a `v_gate` or `v_in`, as opposed to `myVariable`.
- Do not rename the results.zip file, or rename it to "results.zip". We recommend organizing your xcos files into proper project folders and further into proper circuit-type folders, and then proceeding to overwrite the results.zip file for each circuit.
- Make sure if you are doing a step response that you have tuned your corner frequencies, as well as your sample rate, to see the response you are expecting. For example, if using a follower-integrator with 10nA bias current and a 100Hz sample rate, don't be surprised if the step responds instantaneously.

Also remember that the DACs used are 7bit devices. A transfer curve (slow, through a higher res ADC) looks like:

