
Functionality Explanation and Current Statues of GUI

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Functionality Explanation--Configuration

The screenshot displays the NanoLab configuration interface, divided into three main sections: Setup, Experiment Run, and Data Analysis.

Setup Panel:

- Configuration:** A red box highlights this section, containing input fields for P (128), Q (48), DIV1 (6_e) (125), and DIV2 (DAC) (5). It includes a 'Reset Default' button and a 'Confirm' button.
- Chip4 Setup:** Contains dropdown menus for PGA_Gain_L, PGA_Gain_R, Clock Enable, ADC Enable, TIA Enable, Bias Enable, and TIA/ADC (F). It includes a 'Confirm' button and a 'Hint' button.
- NI Daq Setup:** Contains input fields for Period (s), ScanRate, Peak Voltage (V), Bottom Voltage (V), and Voom (M). It includes a 'Reset Default' button, a 'Confirm' button, and a 'Hint' button.

Experiment Run Panel:

- Plotting Choice:** Includes radio buttons for 'Realtime V vs I' (selected), 'ADC Input (voltage)', and 'ADC Output (Code)'. It also has a 'Chose PlotMode' button.
- Plotting Mode:** Includes radio buttons for 'V-I' (selected), 'V-t', and 'Code-t'.
- Data Plot:** Features a 'Please Choose Specific Channel to Plot' dropdown, a 'Duration (s)' input field (0 to MAX), and a 'Plot' button. It contains two large empty plot areas.
- Buttons:** 'Start Realtime', 'Stop Realtime', and 'Save Data' buttons are located on the left side of the plot area.

Data Analysis Panel:

- Write In File:** Includes radio buttons for 'Save V to I Plot' (selected), 'Save DC Plot', and 'Save FSCV Plot'. It has a 'Confirm' button.
- Buttons:** 'Clear' and 'Unload' buttons are located at the bottom right.

- Confirm button will setup the FPGA, uploaded the needed libraries, and make sure the NI DAQ is ready to be used.
- Hint Button will help user by providing useful info
- 'Reset Default' button will reset default variables so that users have no need to edit the boxes each time.
- Status: Done



Functionality Explanation-- Chip4 Setup

Setup

Configuration

Reset Default

P 128

Q 48

DIV1(β_o) 125

DIV2(DAC) 5

Confirm Hint

Chip4 Setup

PGA_Gain_L -3dB

PGA_Gain_R -3dB

Clock Enable RL

ADC Enable RL

TIA Enable RL

Bias Enable RL

TIA/ADC (f) TIA

Confirm Hint

NI Daq Setup

Reset Default

Period (s) 0.1

ScanRate 200

Peak Voltage (V) 1.3

Bottom Voltage (V) -0.4

Voom (V) 0

Confirm Hint

Experiment Run

Plotting Choice

☒ Realtime V vs I

☐ ADC Input (voltage)

☐ ADC Output (Code)

Chose PlotMode

Plotting Mode

☐ V-I

☐ V-t

☒ I-t

☐ Code-t

Start Realtime

Stop Realtime

Save Data

Data Plot

Please Choose Specific Channel to Plot

Duration (s) 0 to MAX

Plot

Hint

Data Analysis

Write In File

☒ Save V to I Plot

☐ Save DC Plot

☐ Save FSCV Plot

Confirm

Clear

Unload

- Default Values and Choices will be given in the pop-up menu.
- Confirm button will setup the Chip4 by one click.
- Hint button will provide simple instructions for user.
- Status: Done



Functionality Explanation-- NI Daq Setup

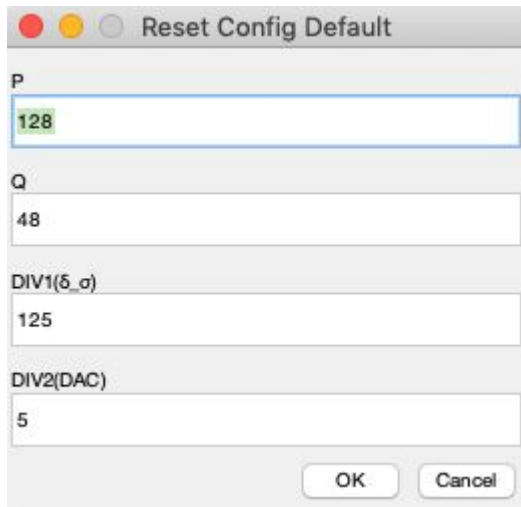
The screenshot displays the NI Daq Setup software interface, which is divided into several functional panels:

- Setup Panel:** Contains configuration settings for parameters P (128), Q (48), DIV1 (5), and DIV2 (DAC). It includes a 'Reset Default' button and 'Confirm'/'Hint' buttons.
- Chip4 Setup Panel:** Configures hardware settings such as PGA_Gain_L, PGA_Gain_R, Clock Enable, ADC Enable, TIA Enable, Bias Enable, and TIA/ADC (R). It also features a 'Reset Default' button and 'Confirm'/'Hint' buttons.
- NI Daq Setup Panel (highlighted with a red box):** Configures data acquisition parameters including Period (s) (0.1), ScanRate (200), Peak Voltage (V) (1.3), Bottom Voltage (V) (-0.4), and Voom (V) (0). It includes a 'Reset Default' button and 'Confirm'/'Hint' buttons.
- Experiment Run Panel:** Allows users to select a plotting choice (Realtime V vs I, ADC Input, or ADC Output) and a plotting mode (V-I, V-t, I-t, or Code-t). It includes 'Start Realtime', 'Stop Realtime', and 'Save Data' buttons.
- Data Plot Panel:** Displays two empty plots for 'Please Choose Specific Channel to Plot'. It includes a 'Duration (s)' field (0 to MAX), a 'Plot' button, and a 'Clear' button.
- Data Analysis Panel:** Provides options to 'Write In File' (Save V to I Plot, Save DC Plot, or Save FSCV Plot) and a 'Confirm' button.

- After clicking confirm button, the input ramp signal will be generated by given variables.
- 'Reset Default' button will reset default variables so that users have no need to edit the boxes each time.
- Status: **Done**



Functionality Explanation-- Reset Default



Reset Config Default

P
128

Q
48

DIV1(δ_α)
125

DIV2(DAC)
5

OK Cancel

- This box will pop up while user click Reset Default.
- Changing the values and click OK, user created new default value and will be permanently shown on GUI until the next reset.
- Status: Done



Functionality Explanation--Plotting Choice

The screenshot displays the NanoLab software interface, which is divided into several functional panels. The 'Setup' panel on the left includes 'Configuration' and 'Chip4 Setup' sections with various input fields and buttons. The 'Experiment Run' panel in the center features a 'Plotting Choice' section, which is highlighted with a red rectangular box. This section contains three radio button options: 'Realtime V vs I' (which is selected), 'ADC Input (voltage)', and 'ADC Output (Code)'. Below these is a 'Chose PlotMode' button and a 'Plotting Mode' section with three radio button options: 'V-I', 'V-t', and 'I-t' (which is selected). Further down are 'Start Realtime', 'Stop Realtime', and 'Save Data' buttons. The 'Data Plot' panel on the right shows three empty coordinate systems for plotting data. The 'Data Analysis' panel on the far right includes a 'Write In File' section with three radio button options: 'Save V to I Plot' (selected), 'Save DC Plot', and 'Save FSCV Plot', followed by a 'Confirm' button. At the bottom right of the 'Data Plot' panel is a 'Clear' button, and at the bottom right of the 'Data Analysis' panel is an 'Unload' button.

Setup

Configuration

P: 128

Q: 48

DIV1 (5 σ): 125

DIV2 (DAC): 5

Confirm Hint

Chip4 Setup

PGA_Gain_L: -3dB

PGA_Gain_R: -3dB

Clock Enable: RL

ADC Enable: RL

TIA Enable: RL

Bias Enable: RL

TIA/ADC (F): TIA

Confirm Hint

NI Daq Setup

Period (s): 0.1

ScanRate: 200

Peak Voltage (V): 1.3

Bottom Voltage (V): -0.4

Vcom (V): 0

Confirm Hint

Experiment Run

Plotting Choice

☒ Realtime V vs I

☐ ADC Input (voltage)

☐ ADC Output (Code)

Chose PlotMode

Plotting Mode

☐ V-I

☐ V-t

☒ I-t

☐ Code-t

Start Realtime

Stop Realtime

Save Data

Data Plot

Please Choose Specific Channel to Plot: [Dropdown]

Duration (s): 0 to MAX

Plot

Hint

Data Analysis

Write In File

☒ Save V to I Plot

☐ Save DC Plot

☐ Save FSCV Plot

Confirm

Clear

Unload

- User could choose which plot they want before the real time plot.
- Status: Done



Functionality Explanation-- Realtime Plot

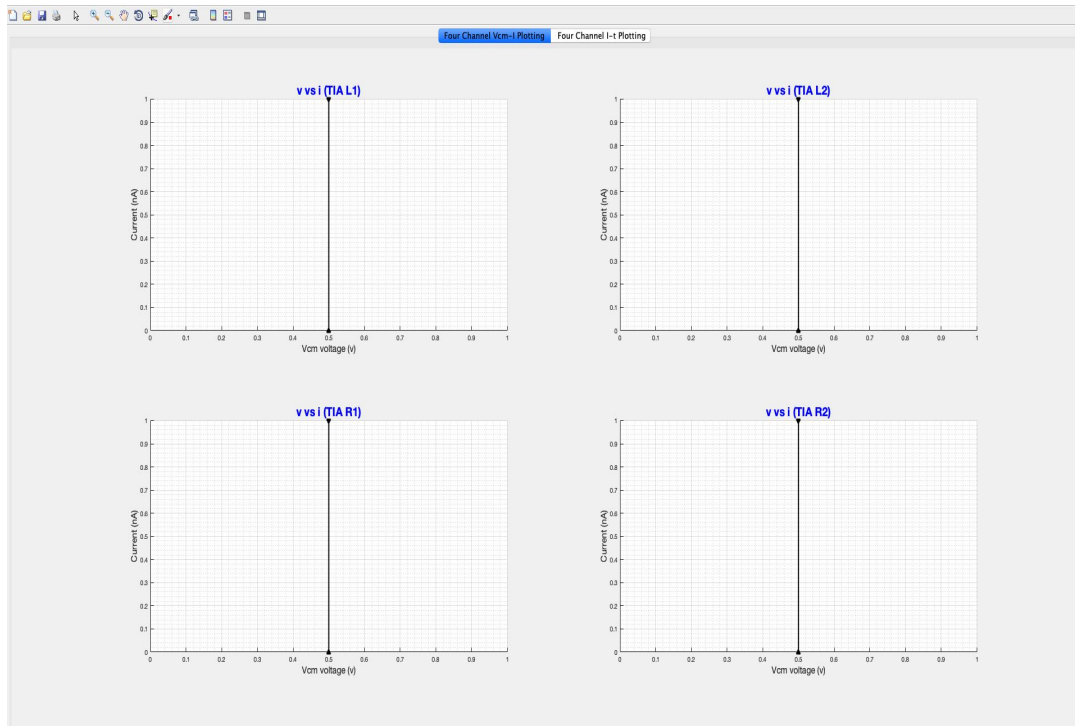
The screenshot displays the NanoLab Realtime Plot interface, which is divided into three main sections: Setup, Experiment Run, and Data Analysis.

- Setup Panel:** Contains configuration options for the experiment. It includes a 'Configuration' section with fields for P (128), Q (48), DIV1 (125), and DIV2 (5). Below this is a 'Chip4 Setup' section with fields for PGA_Gain_L, PGA_Gain_R, Clock Enable, ADC Enable, TIA Enable, Bias Enable, and TIA/ADC (R). At the bottom is an 'NI Daq Setup' section with fields for Period (s), ScanRate, Peak Voltage (V), Bottom Voltage (V), and Voom (V). Each section has 'Confirm' and 'Hint' buttons.
- Experiment Run Panel:** This panel is highlighted with a red box. It contains a 'Plotting Choice' section with radio buttons for 'Realtime V vs I' (selected), 'ADC Input (voltage)', and 'ADC Output (Code)'. Below this is a 'Chose PlotMode' section with radio buttons for 'V-I', 'V-t', 'I-t' (selected), and 'Code-t'. At the bottom of this panel are three buttons: 'Start Realtime', 'Stop Realtime', and 'Save Data'.
- Data Plot Panel:** This panel displays the real-time plot. It includes a 'Please Choose Specific Channel to Plot' dropdown menu, a 'Duration (s)' field set to 0 to MAX, and a 'Plot' button. The plot area shows three empty coordinate systems with axes ranging from 0 to 1. A 'Clear' button is located at the bottom right of the plot area.
- Data Analysis Panel:** This panel contains a 'Write In File' section with radio buttons for 'Save V to I Plot' (selected), 'Save DC Plot', and 'Save FSCV Plot'. A 'Confirm' button is located at the bottom right of this section.

- 'Start Realtime' is a push button. After clicking it, GUI starts to realtime plot. If user re-click it, it won't stop but start to plot at time 0.
- 'Stop Realtime' is a toggle button, which means user need to click this to stop and continue real time plot.
- 'Save Dave' is a toggle button. Users could save data at whenever they want.



Functionality Explanation-- Realtime Plot



- After clicking Start Realtime, rather than directly plotting on the GUI, A new window will be popped up and start to realtime plot.
- Because user could use tools like 'Zoom in', 'Zoom out', and 'Pan' directly on this window.
- Those black vertical lines are cursor-bars. User could drag it to wherever they want. When it is plotted, y-value could be displayed next to the cursor.
- Status:
 - Stop button worked properly.
 - Realtime Plot worked properly for some of cases, still required more tests.
 - Save data button required more tests.



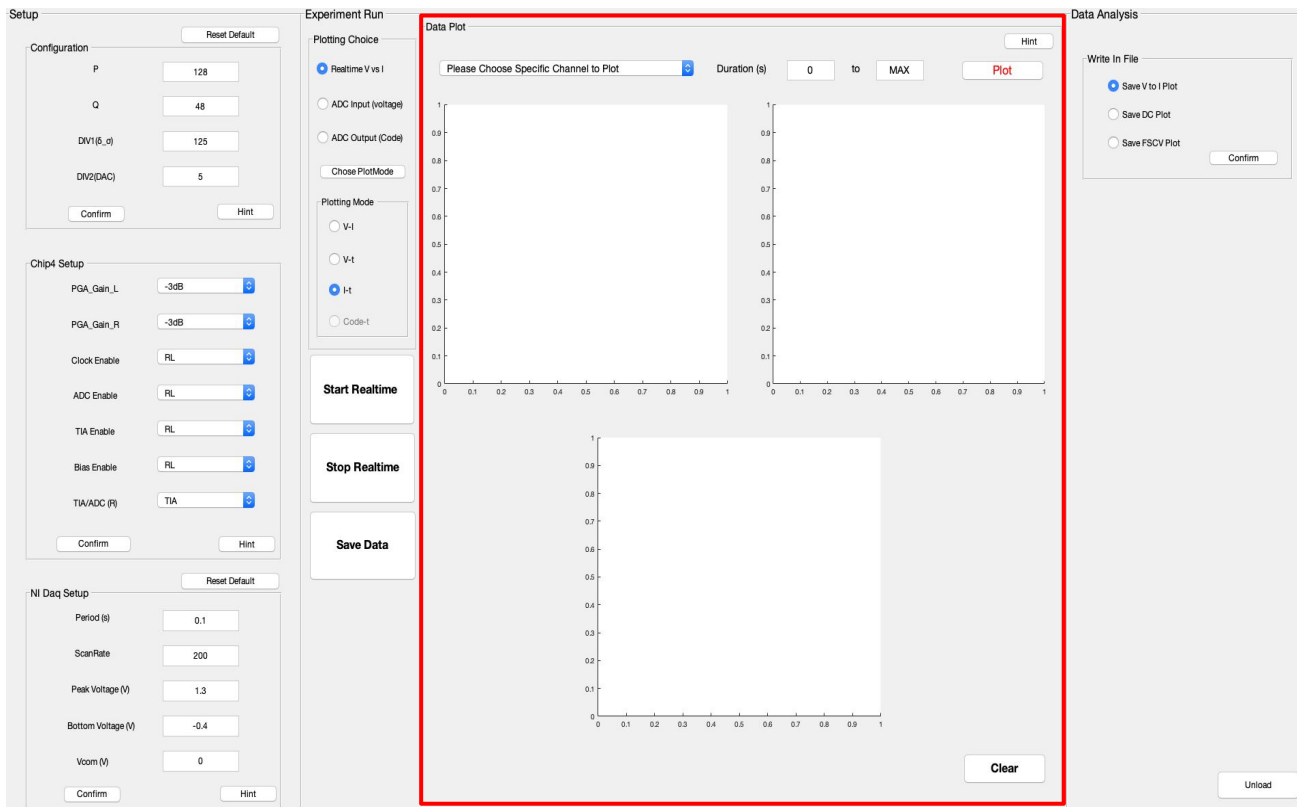
Functionality Explanation -- Write in File

The screenshot displays the NanoLab GUI with three main panels: Setup, Experiment Run, and Data Analysis. The Setup panel on the left includes Configuration (P: 128, Q: 48, DIV1(S_d): 125, DIV2(PAC): 5) and Chip4 Setup (PGA_Gain_L: -3dB, PGA_Gain_R: -3dB, Clock Enable: RL, ADC Enable: RL, TIA Enable: RL, Bias Enable: RL, TIA/ADC (R): TIA). The NI Daq Setup section at the bottom left shows Period (s): 0.1, ScanRate: 200, Peak Voltage (V): 1.3, Bottom Voltage (V): -0.4, and Voom (V): 0. The Experiment Run panel in the center features Plotting Choice (Realtime V vs I selected), ADC Input/Output options, Plotting Mode (V-I, V-t, I-t, Code-t), and buttons for Start Realtime, Stop Realtime, and Save Data. The Data Plot section shows three empty plots. The Data Analysis panel on the right contains a 'Write In File' dialog box, which is highlighted with a red rectangle. This dialog box has three radio button options: 'Save V to I Plot' (selected), 'Save DC Plot', and 'Save FSCV Plot', along with a 'Confirm' button.

- By choosing what kind of file and clicking 'Confirm', GUI could generate relative .txt files into the working folder.
- Statue: **Finish Implementation, need to test.**



Functionality Explanation -- Data Plot



- Data Plot panel **cannot** support realtime plot. But it is the plot center for users to plot data been analysed, like calibration and FSCV_Analysis.
- User could choose specific channel, time period, and certain files to plot data.
- Status: **Pending**



Conclusion and what will do next week

- New Gui has been implemented 70%-80% for Vitro measurement. (Continue working on GUI Implementation, test, and debug)
- Most of functionality has been finished but some of them need further and comprehensive tests before actual Vitro measurement. (I will do it next week).
- Debug the firmware (Verilog Code) to support at least 1 hour continuously plot.
- Debug the dataSave_FSCV to make sure it could generate TIA input ramp signal for at least 1 hour.

