Novacal

About NOVACAL

NOVACAL is a tool designed to quickly load & plot data collected with a Novabox data logger, perform coil calibrations and generate FIR filters. The program is an electron app (js front end, GO backend), web sockets are used to communicate between the front and backend.

Installation

Method 1: Using the Installer

1. Download "NOVACAL Setup 1.0.0.exe" from the releases page at
2. Run the installer
3. Follow the on-screen prompts
4. Launch NOVACAL from the Start menu or desktop shortcut

Method 2: Building from Source

Clone the repository:

git clone https://github.com/anthonyznova/novacal.git

Install dependencies:

cd novacal

npm install

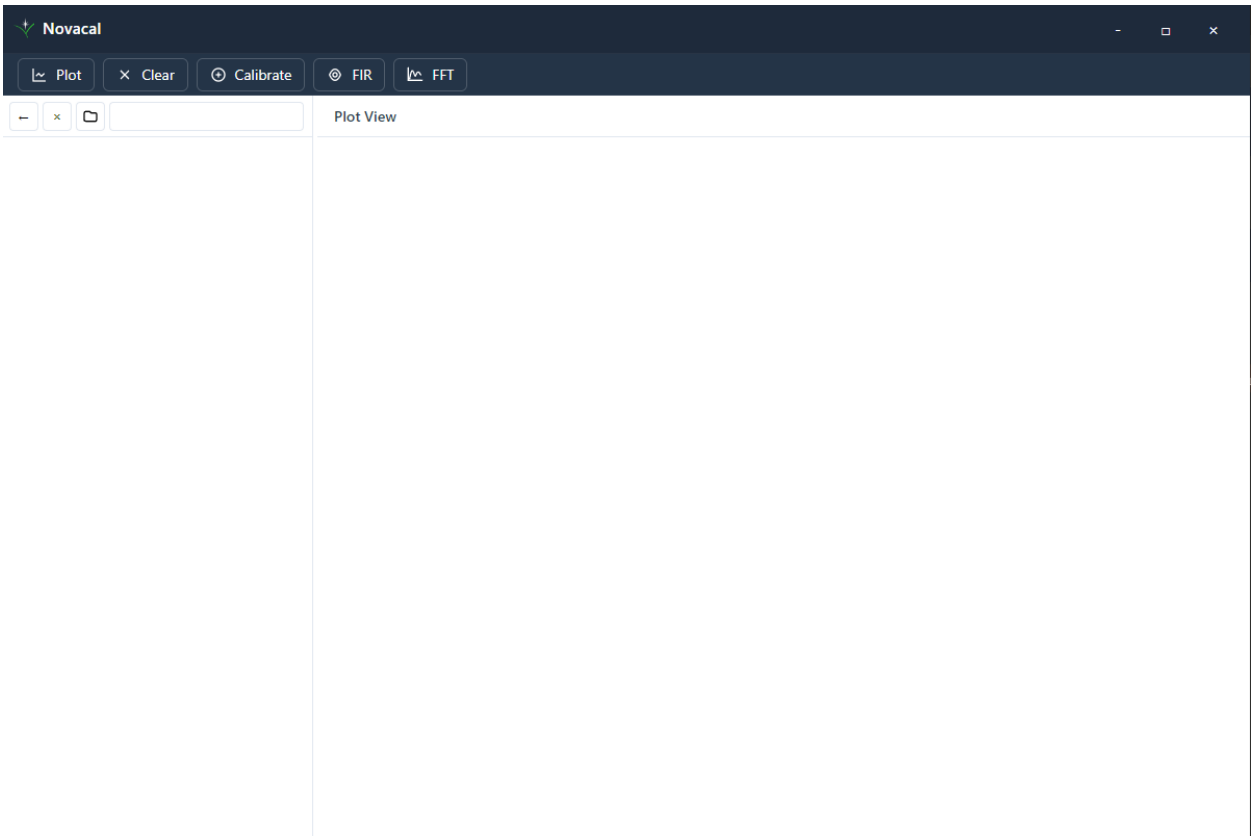
Launch the application:

npm start

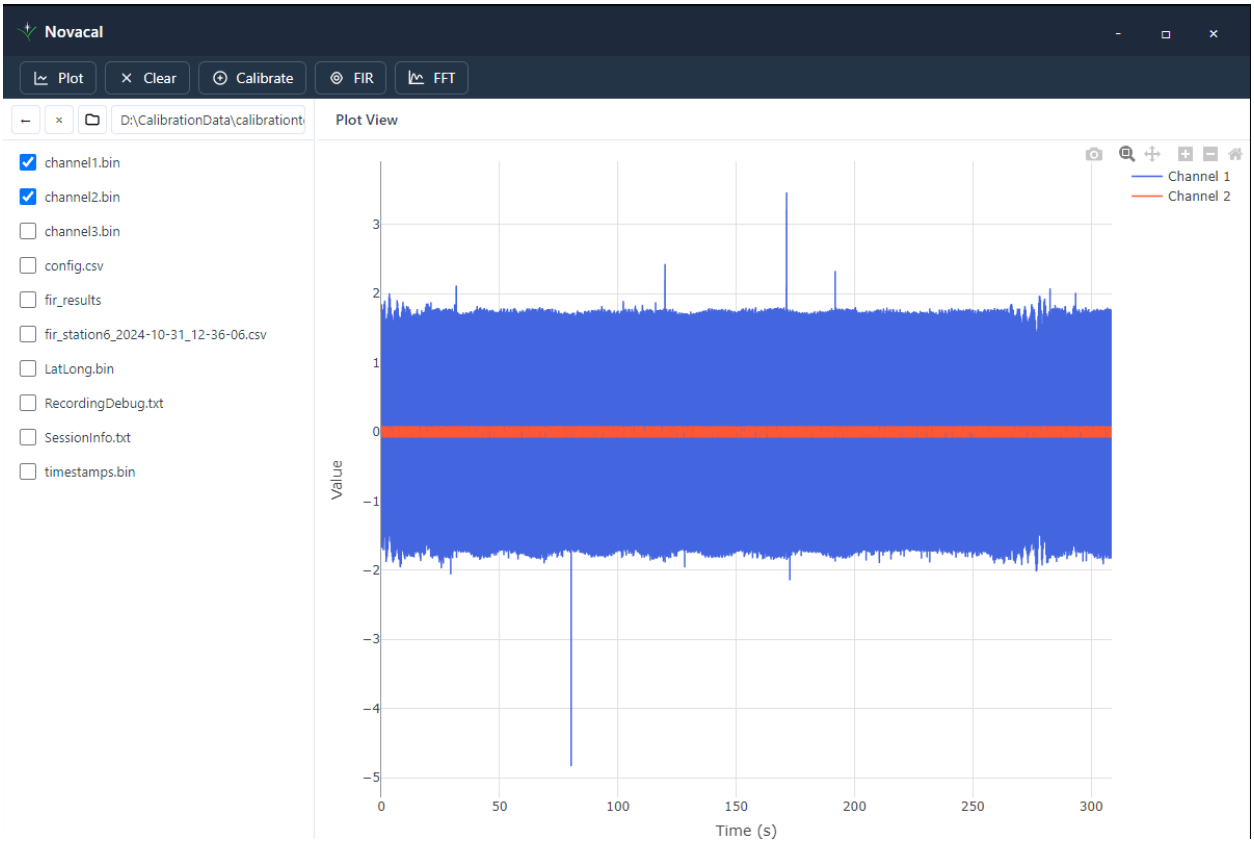
Novacal UI

Upon first launching NOVACAL, you'll be presented with the main interface. The application is organized into several key areas:

- File Browser Panel (left)
- Time Series Viewer (center)
- Toolbar (top)



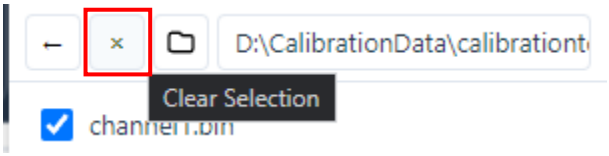
You will want to point Novacal to your directory of NVBX folders, to do this click on the folder icon and set the working directory. You can always navigate to any directory within the left container using the back arrow and by **double clicking** any folder to step in to it. The checkboxes next to the folder contents is how all the functionality is initialized, for example we can select .bin files to be plotted.



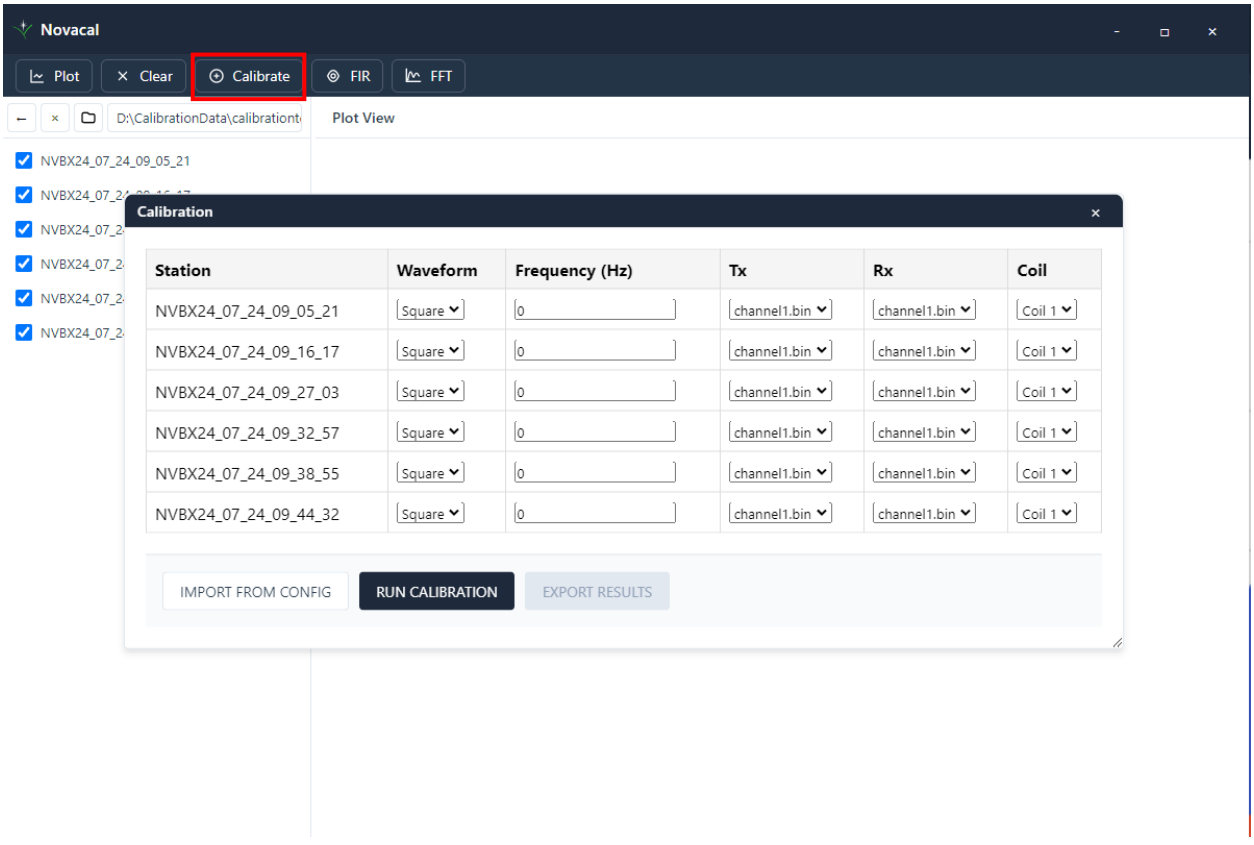
Note: the build in time series plotter is pretty good (if I do say so myself) the dynamic rendering is handled by the GO backend so the plot is responsive and quick to maneuver, consider the following keyboard commands for the plot.

Scroll wheel = horizontal zoom
Ctrl + scroll wheel = vertical zoom
left click drag = zoom to box
shift + left click drag = pan
double left click = reset axes
click on legend entry to toggle view

Now instead of manually unselecting files / folders in the directory you can use the clear selection button next to the folder icon. Also the clear button next to the plot button will delete any plots in the Plot View.



The next major functionality is the ***Calibrate*** function, for this we require that the user selects the folders (stations) to be included in the calibration, don't worry you can also select the parent folder and it will select all NVBX folders in the path. Once all stations are selected click the calibrate button on the top task bar (highlighted red box), this will launch the calibration UI window.



The user can either manually populate the fields of this table, or, click import from config and if the station contains a config.csv file formatted like below then it will auto populate the table. When ready click Run calibration and the calibration will begin, the progress will be shown in the bottom left. Once complete the user can click the “Export Results” button which will prompt you to select a directory to export to.

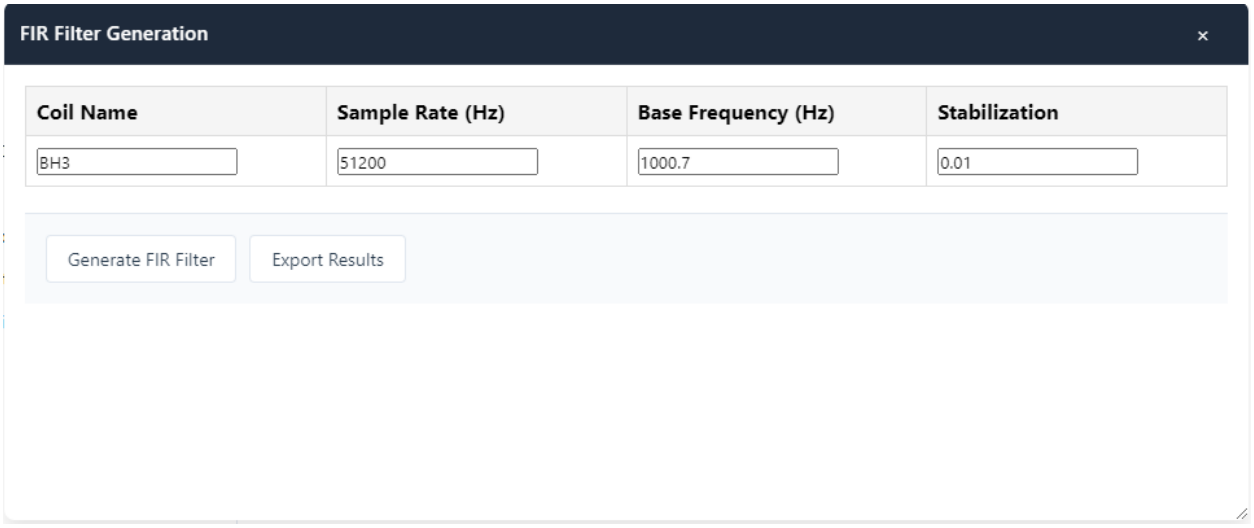
```
name,waveform,freq,tx,rx,coil
station6,square,1000.7,channel2.bin,channel1.bin,coil1
```

The format of the exported csv file is shown below and is simply the amplitude and phase values at the given frequency, the coil is also included in the csv this is for the case where you might be calibrating a tripod and need to differentiate between the individual legs ie. (coil 1 = leg1, coil 2 = leg 2 etc)

```
Frequency,Amplitude,Phase,Coil
0.03747148908439231,-8.604804484066854,152.3541552690874,Coil 1
0.10738691832085909,9.676364276846543,139.68529766017946,Coil 1
0.11078527207559465,10.154660590300493,137.94394540061214,Coil 1
0.18572825024437925,19.759340788790208,118.70449208976058,Coil 1
0.2590420332355816,25.15515697613617,89.78623646057919,Coil 1
0.32053368044256425,27.187990915174687,66.41125193467349,Coil 1
0.3323558162267839 5,27.55377937475608,62.46221906178461,Coil 1
0.40729879439556854,27.968295027795694,43.880831225601824,Coil 1
0.4806125773867709,27.83844863064299,31.589050133823207,Coil 1
0.5353075170842825,27.717512601022793,24.971670485428234,Coil 1
0.5555555555555555,27.660987671330254,23.37714970764617,Coil 1
0.6288693385467579,27.47614644748731,17.620080930897444,Coil 1
0.7038123167155425,27.35522718188261,13.427068201625161,Coil 1
```

Upon successful calibration the phase and amplitude plots will be populated in the Plot View like below. If there is multiple legs calibrated they will be plotted on the same axes, you can also click the camera icon in the top right of the plot to save the results as a png file for record keeping purposes.

The final function is the FIR filter generator, simply select the data station you wish to create the filter for and click the FIR button on the top task bar. A new UI window will pop up like the image below, the user should fill out the fields of the table.



The stabilization parameter is a constant used in the solving of the Toeplitz matrix, essentially it is added to make the system more numerically stable, ie. For a lower value (0.00001), the coefficients will produce a result closer to a perfect square wave but more susceptible to high noise, and vice versa for higher values (0.1). once the table is populated click “Generate FIR Filter” and it will eventually plot the stacked, target and filtered waveforms in the plot view. Click Export to save the filter coefficients to a directory of your choosing.