README

scana is an abbreviation for "(s)ingle (c)hannel (ana)lysis" and is intended to help with the data analysis of single channel measurements.

Installation

The *scana* software is a tool written in Python and can therefore be run on various platforms. The starting point is an installed Python3 interpreter, at least **Python v3.8.9** or newer is recommended. To install the necessary Python packages, *pip* must also be installed. The required Python packages and the corresponding lowest supported version numbers are listed below.

Module name	Version
numpy	1.24.2
matplotlib	3.7.1
scipy	1.8.1
pandas	1.5.3
xlrd	1.2.0
xlwt	1.3.0

The installation of Python with all the required the packages should be done in a few minutes, an installation of *scana* is not necessary.

Install Python & *pip* on Windows

To install Python on Windows computers please follow the instructions on the official Python homepage, https://www.python.org/downloads/windows/ . The *pip* tool is automatically installed with the Python installation, if not, please visit https://www.geeksforgeeks.org/how-to-install-pip-on-windows/ .

Open "Command Prompt" and run

```
pyhton --version
```

to check the installed version.

Install Python & *pip* on Linux

Python3 is automatically pre-installed on most Linux distributions. If not, please use the package manager to install Pyhton3 on your Linux computer.

***apt* Package Manager**

```
sudo apt-get install python3 python3-pip
```

dnf Package Manager

```
sudo dnf install python3 python3-pip
```

If you need further help with the Python installation please visit https://docs.python-guide.org/starting/install3/linux/.

Open your favorite terminal and run

```
pyhton --version
```

to check the installed version.

Install required Python Modules

To install the required Python packages, open "Command Prompt" on Windows machines or your favorite terminal on Linux machines. Navigate to the *scana* directory and run

```
pip3 install -r requirements.txt
```

to install the required packages.

Remark

Platforms and version numbers with which scana has been successfully tested can be found in the table below.

	Windows 7	Ubuntu 20.04
Python	3.8.9	3.8.10
numpy	1.24.2	1.24.4
matplotlib	3.7.1	3.7.3
scipy	1.10.1	1.10.1
pandas	1.5.3	2.0.3
xlrd	2.0.1	1.2.0
xlwt	1.3.0	1.3.0

Run *scana*

Run on Windows

Open the file explorere and navigate to the *scana* directory. To run *scana*, double click on the file *scana.bat*.
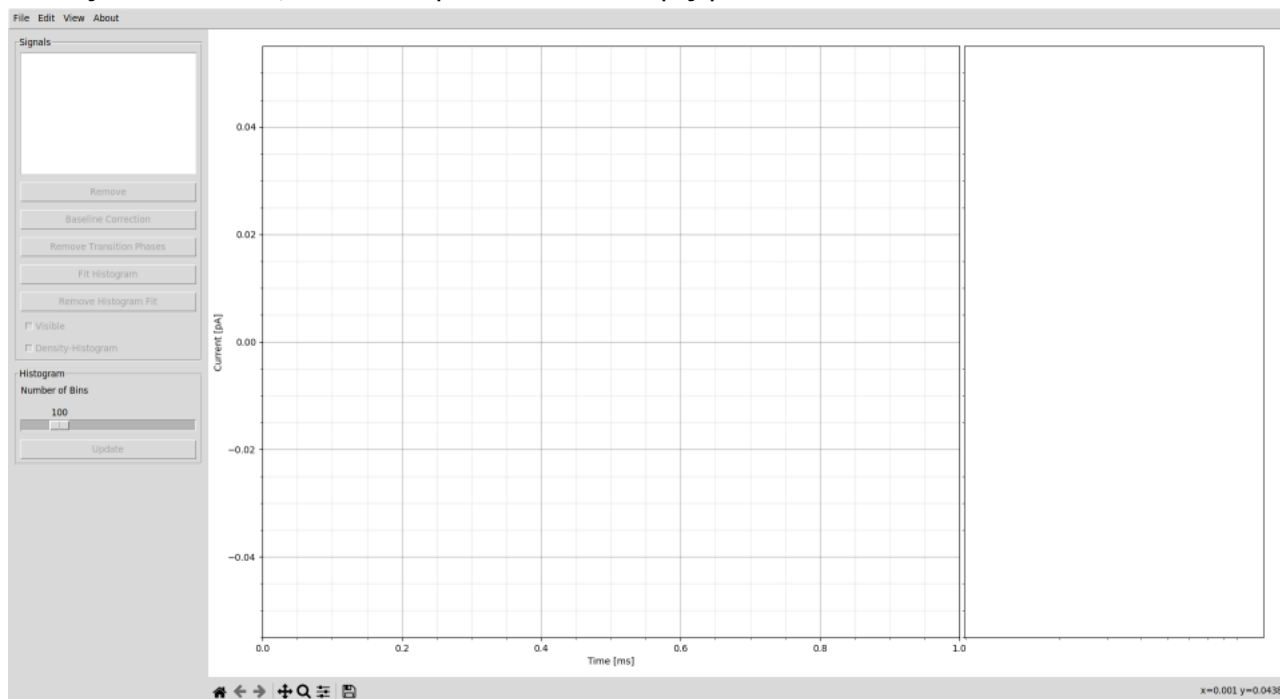
Run on Linux

Open your favorite terminal and navigate to the *scana* directory. To run *scana*, just type
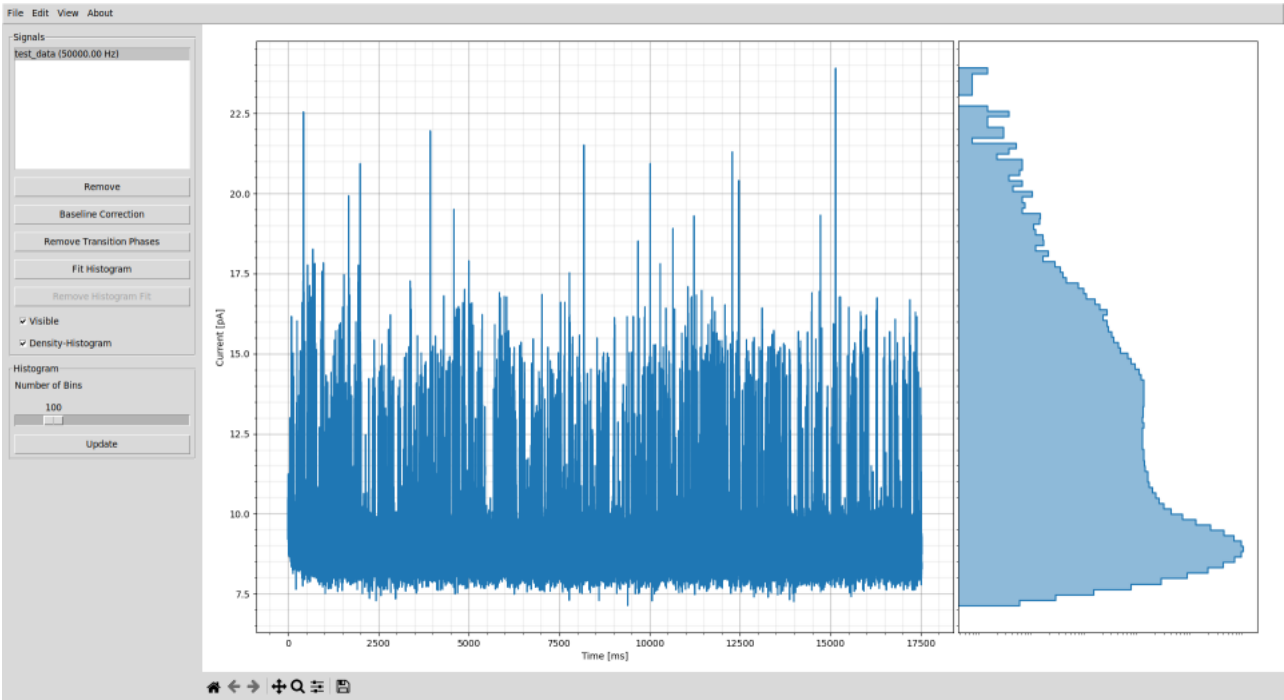
```
bash scana.sh
```

Example

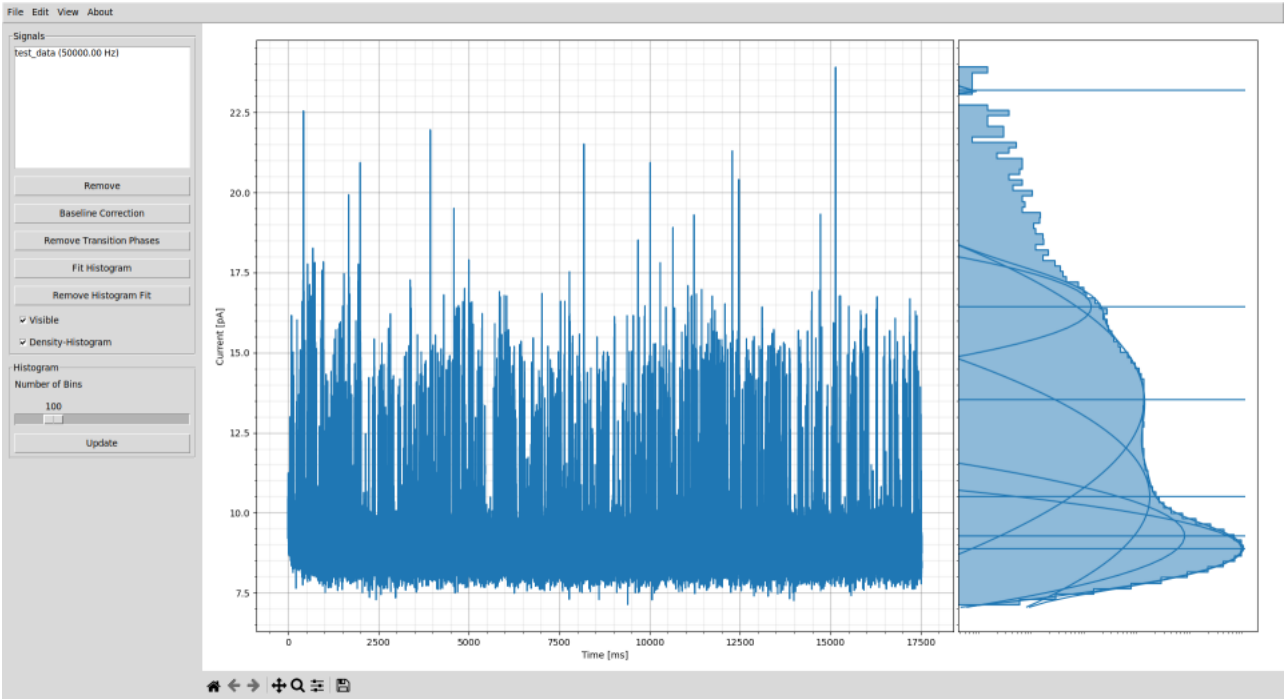- When you start *scana*, a window opens with two empty plot axes.

- Clicking on "File -> Open Signal" opens the file dialog. Navigate to the "data" directory and open the file "test_data.csv".

The signal itself is plotted on the left axis, while the corresponding histogram is shown on the right axis.

- Click on the "Fit Histogram" button and select the number of levels (in this case N=6).

Parameters for N=6 Gaussian distributions are now optimized so that the histogram is approximated as closely as possible. Expected values and the fitted Gaussian distributions are plotted in the histogram. In addition, a window opens displaying mean value, standard deviation, scaling factor, and relative area of all N=6 gaussian distributions. For this example we get:

level	mu	sigma	rho	area
0	8.87532196	0.36805637	0.82427548	0.82427506
1	9.28038763	0.51095489	0.09426576	0.09426505
2	10.50761924	1.05226472	0.04233099	0.04230886

level	mu	sigma	rho	area
3	13.52930348	1.19871217	0.03764671	0.03764671
4	16.43523232	0.45684961	0.00144029	0.00144029
5	23.19680300	0.10056731	0.00000220	0.00000220

The expected runtime for adjusting the curve is in the order of a few seconds.