

## USB setup:

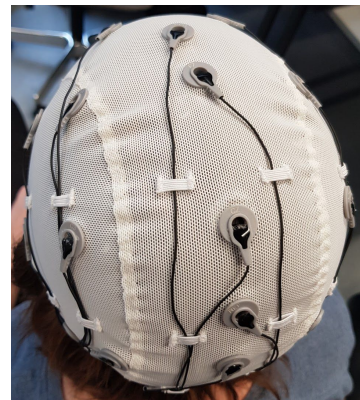
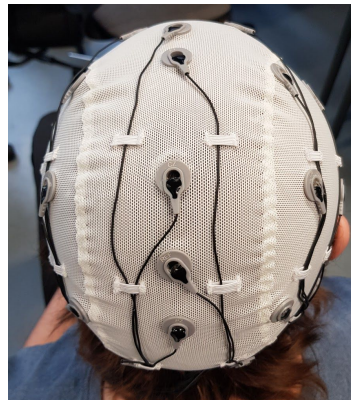
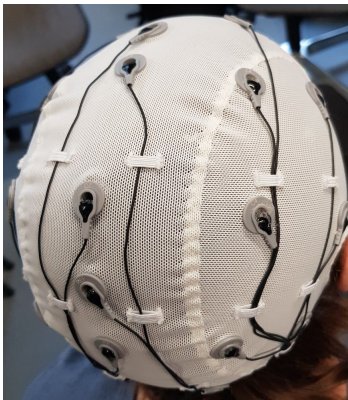
### [Drivers](#)

- The USB port needs to set up to 64bit transmission and receiving
- This link above has a tutorial on how to setup your USB under getting started → Windows

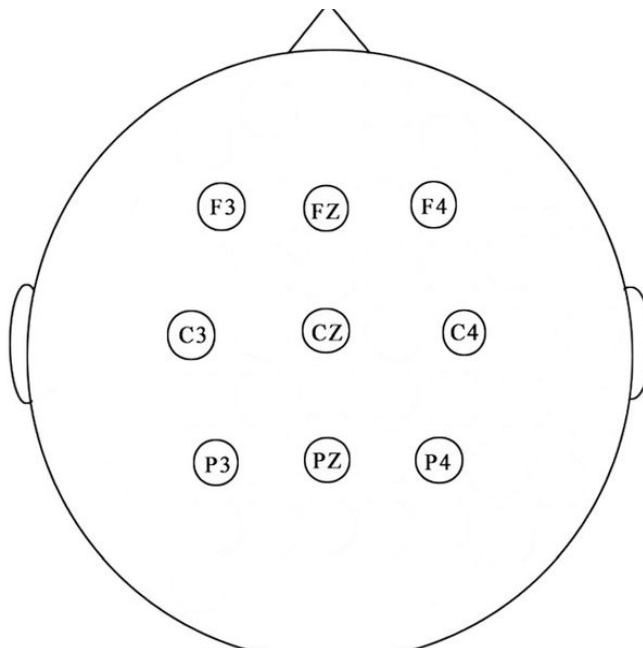
## BCI Setup (step by step):

### Step 1 - Setting up the cap on the participant

- Secure the cap on the participants head with the strap around their chin
  - The cap should be relatively tight without being uncomfortable, the closer to the scalp the better
  - This is how it looks like from above when the cap is on:



- Apply the EEG gel to the needed electrodes through the holes in the cap
  - Fill the included syringe with gel, lift the targeted electrode slightly from the head and fill the hole to the point where you are just able to see the gel and twist the syringe around in order to spread the gel. **This can be uncomfortable for the participant, but should not be painful!**
  - The needed electrodes for this setup is the ones you see in the image below, these names should be marked on the cap as well:



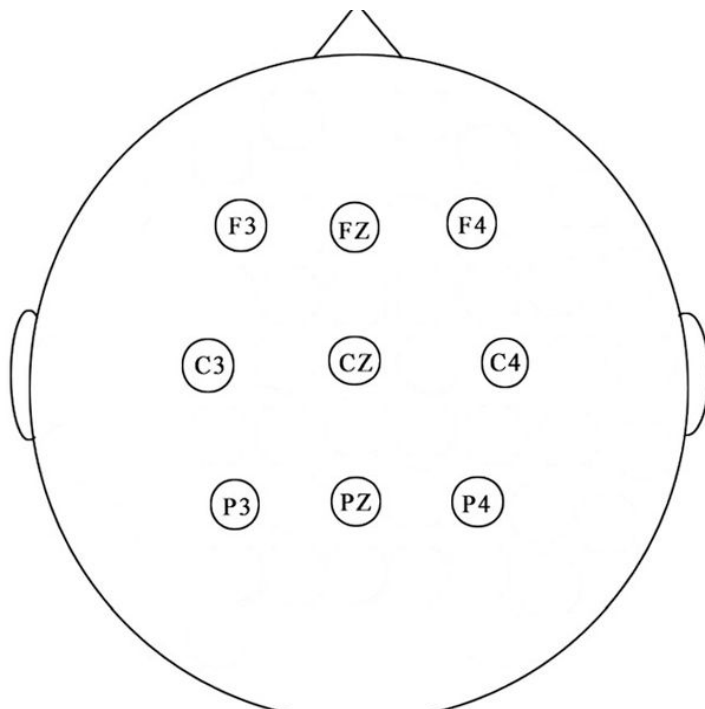
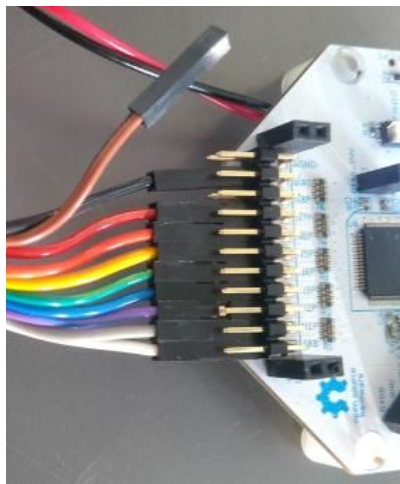
- **Disclaimer:**

- Do not use the gel on participants with open wounds, bruised or weakened skin due to injury or medical condition.
- Do not use gel on participants with a history of skin allergies or sensitivity to cosmetics.
- The participant can wear the cap with the gel for maximum 2 hours before the gel toughens up and starts getting really uncomfortable for them.

**Step 1 - Hardware setup of the BCI**

- Attach the wires from the cap to the BCI, all the wires needed is written below:
  - o Ref: white
  - o F3: grey(F1 on the server)
  - o F4: Purple(F2 on the server)
  - o C3: Blue
  - o CZ: Green
  - o C4: Yellow
  - o P3: Orange(P1 on the server)
  - o P4: Red(P2 on the server)
  - o PZ: Ground(Black)
- The needed wires should be separated from the others with tape, so they are easier to find.

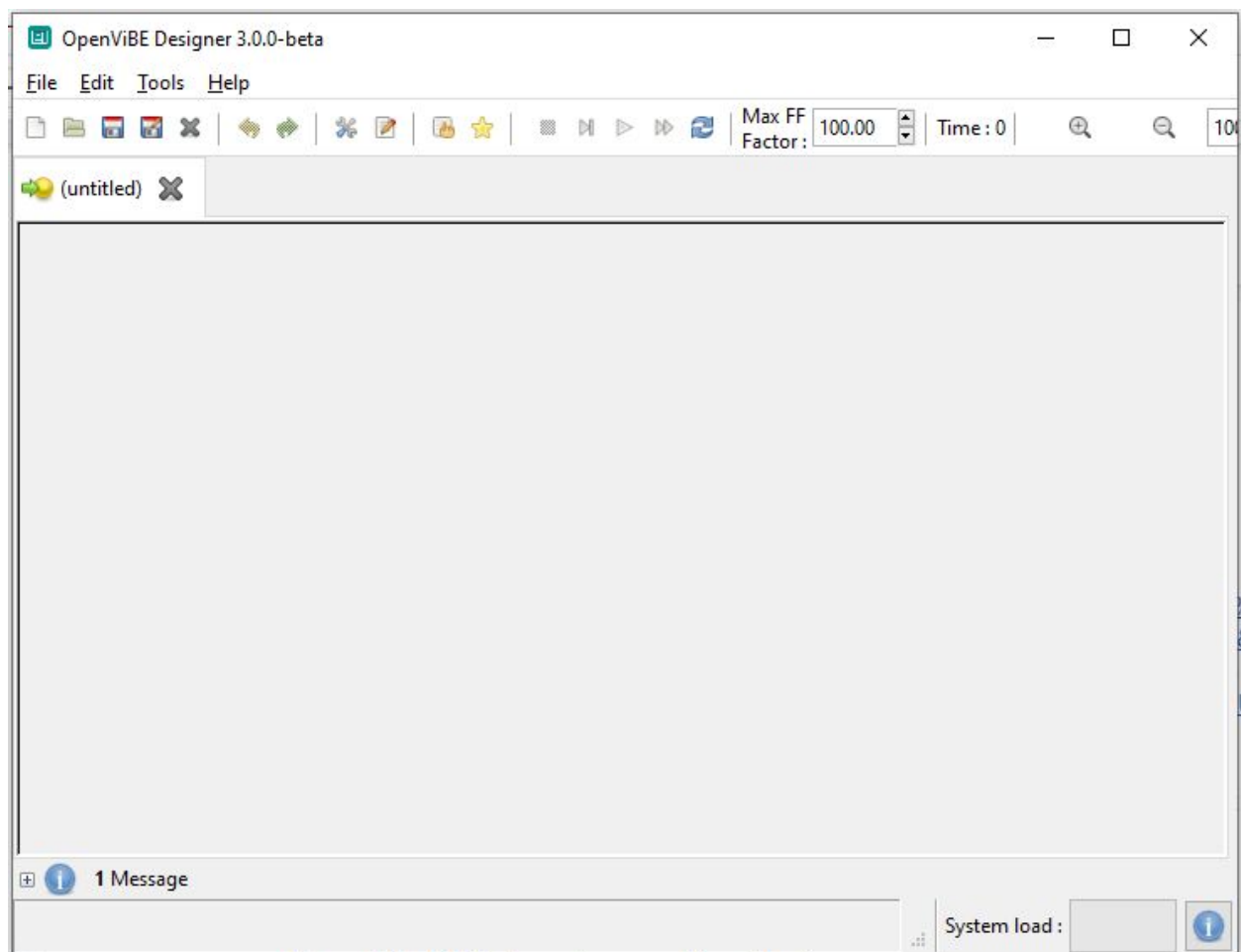
The colour indicates the colour of the wire, and the number indicates where on the BCI they should be attached. Remember to attach the wires on the lowest pins while the BCI is facing upwards as seen in the image below:



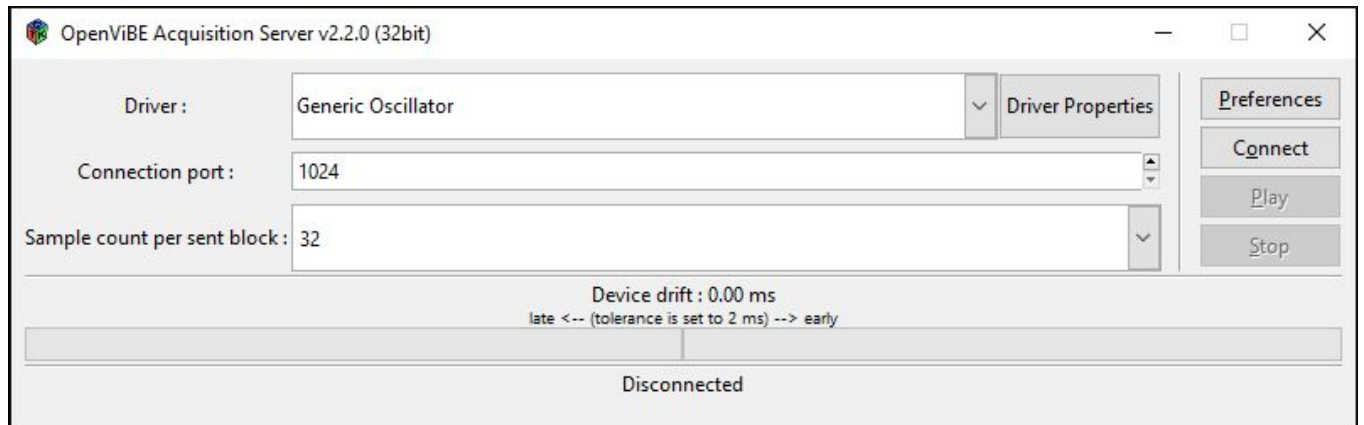
- The names of the wires correspond to their location on the head, as seen in the image above beside the BCI.
- Plug the wireless USB dongle for the BCI into your PC.
- Once plugged into the PC, the BCI should be turned to “PC” on the side of it, in order to turn it on.

## Step 2 - Software setup of the BCI

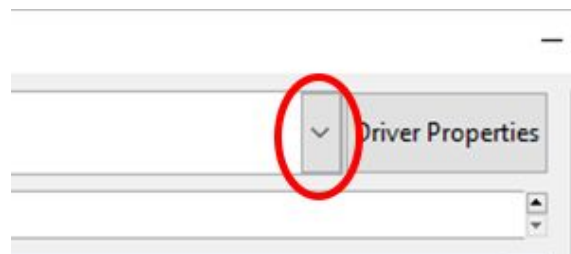
- Download the folder containing the server and client for openBCI from this [link](#)
- In this folder the **OpenViBE Designer 64bit** is located, when you open it the first time it looks like this:



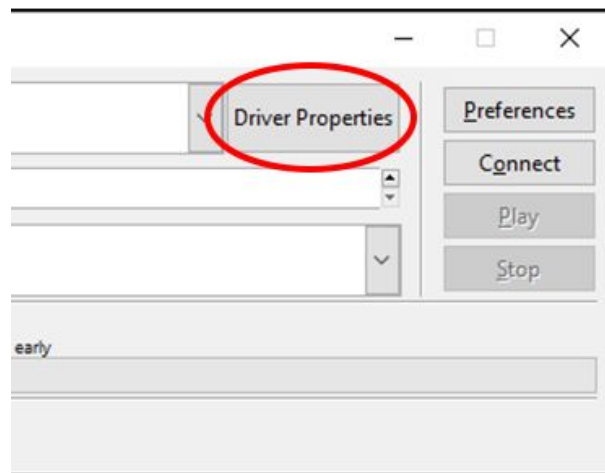
- Next up, open the **OpenViBE Acquisition Server 32bit** from the same folder. When you open it up it should look like this:



- The settings in the **OpenViBE Acquisition Server 32bit** needs to be changed before it is ready to be hooked up to the client inside the **OpenViBE Designer 64bit**
  - Click on the arrow pointing downwards beside **Driver Properties** and choose OpenBCI:



- Now go into "Driver Properties":



- Press on "Change channel names":

**Device configuration**

### OpenBCI reader

Upon initialization, board responses will appear in the console at **Trace** level and should end by "\$\$\$".

The last 3 channels represent accelerometer values.  
The sampling rate and the total number of channels are automatically selected depending on the **Use Daisy Module** option (8 EEG + 3 acc. at 250Hz without, 16 EEG + 3 acc. at 125Hz with).

Use "Custom Commands on Initialisation" to configure the board between reset and streaming. Refer to OpenBCI doc for more details.

Identifier:

Gender:

Age:

Device:

Use Daisy Module: ☐

Custom Commands on Initialization :  
(1 command per line)

Board Reply Reading Timeout (ms)



Board Reply Flushing Timeout (ms)

Configuration Summary: 8 EEG Channels  
3 Accelerometer Channels  
250 Hz Sampling Rate

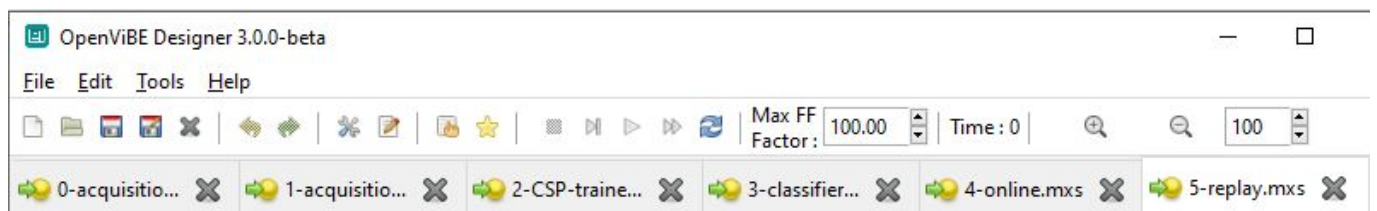
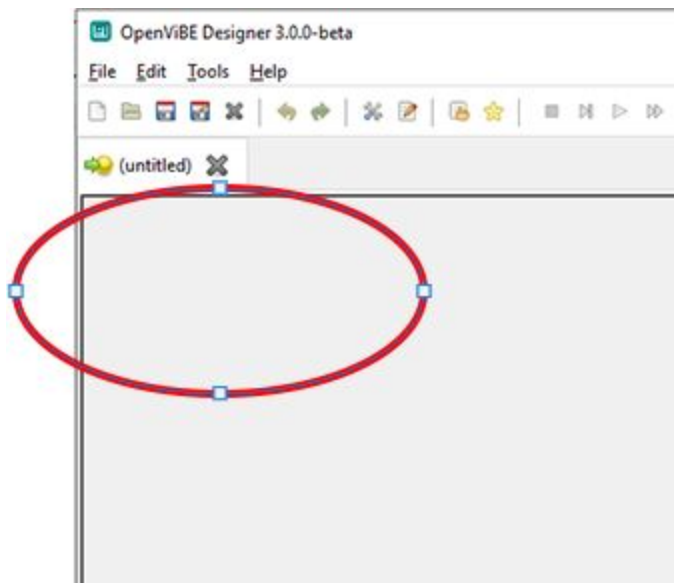
**Change channel names**

- Change the channels so they match the image below:

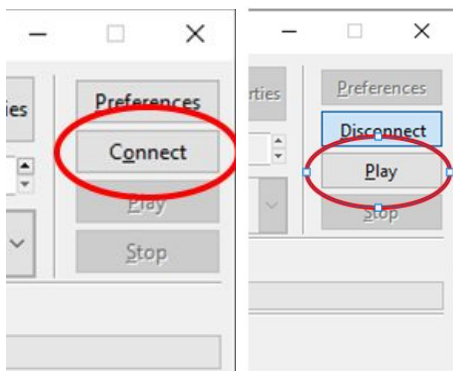
**Choose electrode names...**

Name		Index	Name
P3		1	F1
P1		2	F2
Pz		3	C3
P2		4	Cz
P4		5	C4
P6		6	P1
P8		7	P2
P10		8	
PO7		9	

- Now you need to set up the client in the **OpenViBE Designer 64bit** so it is ready to connect and receive the signal.
  - In the folder you downloaded, the following programs should be available:
    - 0-acquisition-monitoring.mxs
    - 1-acquisition.mxs
    - 2-CSP-trainer.mxs
    - 3-classifier-trainer.mxs
    - 4-online.mxs
    - 5-replay.mxs
  - Open these by dragging them to the window inside the **OpenViBE Designer 64bit** one by one until all of them are open as seen below:

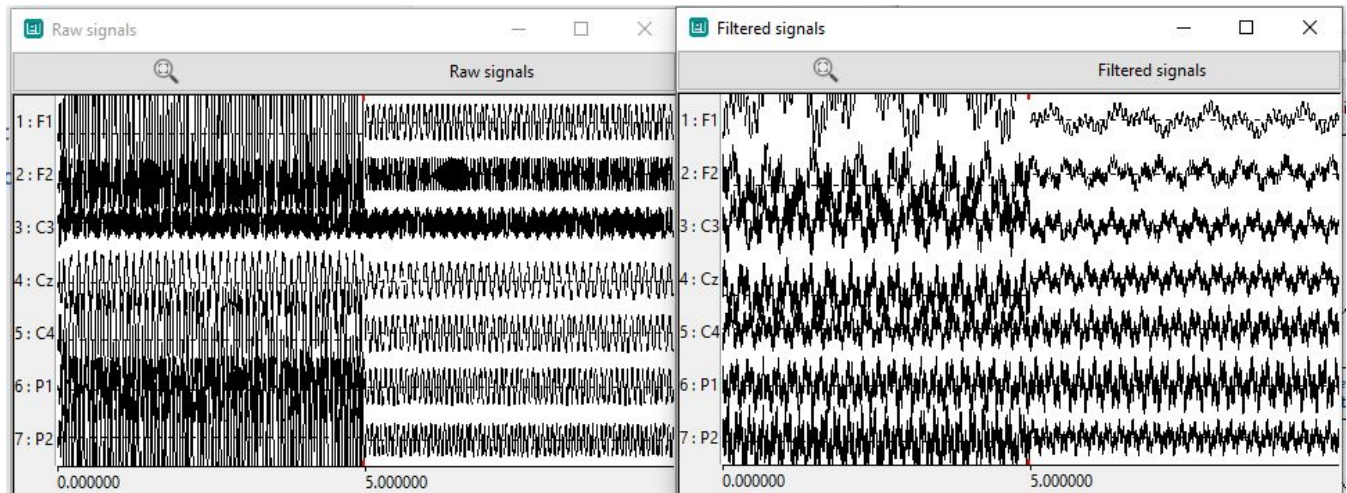


- Now the **OpenViBE Acquisition Server 32bit** can be connected to the **OpenViBE Designer 64bit** by first pressing connect and then play:

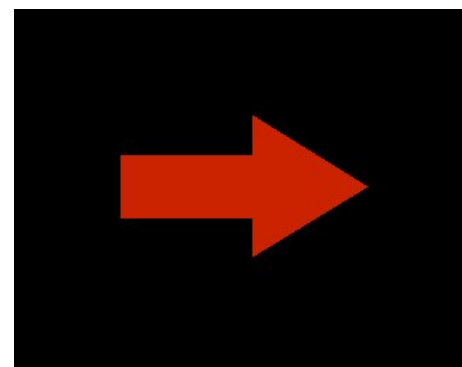




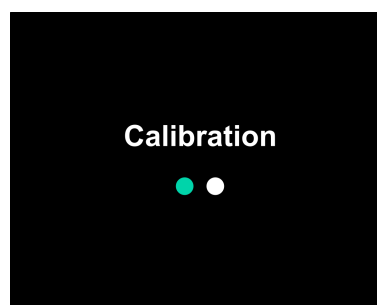
- Now going back into the **OpenVIBE Designer 64bit** it is time for calibration:
  - You need to run each scene from 0 to 5, in order to test the signal and calibrate:
    - **0-acquisition-monitoring.mxs**
      - Shows the signal so you are able to see if it looks as it should, test if blinks and bites can be seen as spikes in the signal
      - The program that should pop up can be seen in the images below:



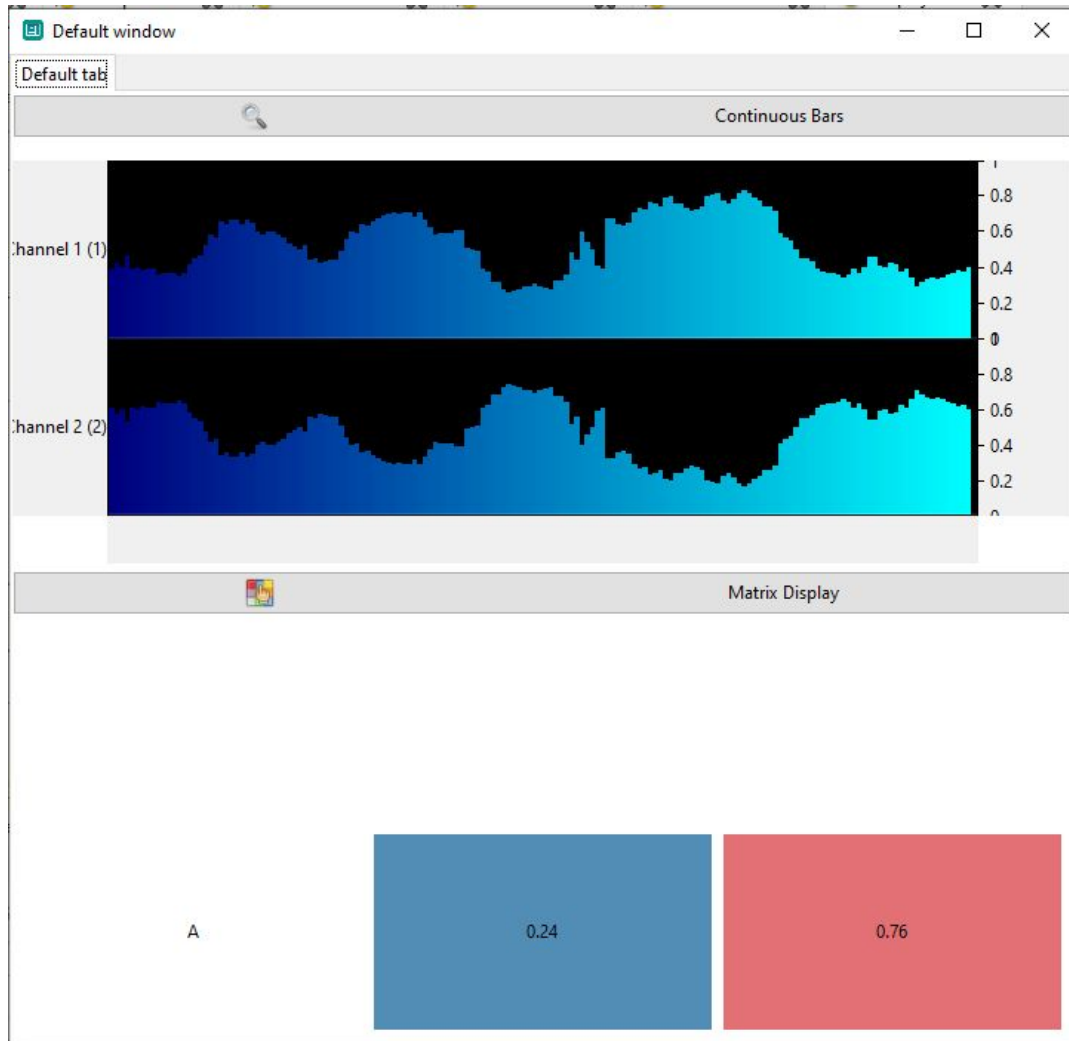
- **1-acquisition.mxs (Takes 40 seconds to start)**
  - This program is run in order to collect the data for the calibration, this is where the person with the BCI cap sits still and performs motor imagery on cue. The cues are shown below, when it says rest the person should rest and when it is a red arrow the person should do motor imagery.



- **2-CSP-trainer.mxs AND 3-classifier-trainer.mxs (Play in fast forward)**
  - These two programs perform the calibration, both of them should be run in speed-forward mode. When they run, a window saying "calibrating" will show up:



- **4-online.mxs AND 5-replay.mxs (Play in normal speed)**
  - Both plays a signal that can be used with Unity, number 4 is the signal you just calibrated and 5 is a generated signal (for testing a system without the cap):



**Tips from the authors:**

- *“Do not wear the BCI and have it turned on while not having the Open VIBE opened as the BCI will cause the mouse to move around on its own. Turn off the BCI if this is the case until Open VIBE has been opened.”*