

Preparing a new SD card for recording

To prepare the card for recording, you need to:

- 1) Configure the SD card for your headstage (done only once)
- 2) “Enable” the card for recording (done after each recording/data transfer cycle). After the recording, you need to transfer the data to the computer, then enable the card for writing again.

Note: to enable maximum write speed, the datalogger does not use a filesystem on the SD card. When you insert the card into your computer, do not allow the computer to format the card.

Currently, all SD card access programs require Windows OS. Open the Command Prompt as Administrator (right click on Command Prompt and choose “Run as administrator”). Then, navigate to the folder containing the SD card file transfer functions. Insert the Micro SD card into your computer (USB adaptors will usually work fine). Then, follow these steps:

- 1) type “listDevices”

This program will list all the removable storage devices plugged into the machine. It may take up to a minute for your computer to see the SD card after you have plugged it into your machine. Keep running the listDevices program until the drive is shown. When it does, it will list the card as 'PhysicalDriveN', where N depends on how many removable devices there are. Make sure you identify the correct number! This number will be referred to as 'N' below.

Note: if you never see the card, there may be a permissions issue. In windows, you need admin permissions to run these programs (see above).

- 2) writeConfig N FILENAME

where N is defined above. **Make sure you use the correct number! This is a low-level write command and choosing the wrong number can direct the writing to your hard drive.** FILENAME is the name of the configuration file for the number of channels your headstage has. For example, a 128 channel headstage uses “config128.cfg” which is included in the file transfer folder. This function is used to write a new configuration to the SD card. This configuration defines the operating parameters of the headstage when it is untethered from the computer and logging to the SD card. The config file has 32 line entries (referring to the 32 channels of each input module), where each entry is a sequence of 8 numbers (0's or 1's, referring to up to the 8 possible input modules). A line entry on row 3 of 00000011 means that the 3rd channel of input modules 1 and 2 are on. In most cases, all 32 entry lines will be the same, unless you want to ignore some channels that you do not want to log. This step is done once per card.

- 3) cardEnable N

This program is used to enable the SD card for recording. Once a card has been used to record data, it must be enabled again. This is to ensure that data is not overwritten before it has been extracted onto your computer.

Now you are ready to record data on the card!

Using the headstage in data logger mode

HH128

The HH128 headstage utilizes a wireless link to communicate with the MCU. Start/stop commands and synchronization commands are sent through the wireless link.

The headstage has some LED indications:

- If the inserted SD card has no configuration file on it the red LED will blink slowly.
- If the inserted SD card is configured but not enabled (see above), the red LED will blink quickly.
- If the inserted SD card is enabled the yellow LED will be on solid until the headstage gets the start acquisition command from the wireless link. At that point the yellow light will turn off.
- Every time it receives a sync signal from the transceiver, the yellow LED will blink briefly (every 10 seconds).
- Once recording has begun, if a packet was not written to the SD card because the SD card was too slow, the red light will briefly flash. This is an important indicator when choosing an SD card brand to use, as some SD cards do not have adequate write speeds to support 128 channels writing at 30 kSample/sec. In general, dropping a packet once in a while is OK, but you will want to avoid cards that result in packet losses at high rates.

To start recording:

- 1) Connect the transceiver antenna into the first auxiliary connector on the front of the MCU, then power on the MCU and (optionally) the ECU.
- 2) Insert the SD card into the SD slot of the headstage
- 3) Connect a 3.7 V battery using the battery adaptor plugged into the HDMI connector
- 4) Start Trodes, and open a workspace with no neural channels configured (like ECUonly.trodesconf).
- 5) Connect to the MCU and start streaming. This will send a signal to the headstage to start recording onto the SD card.
- 6) Open a log file in Trodes and start recording the MCU/ECU environmental data.

Converting SD recording to .rec file

Once you have extracted the temporary .dat file from the SD card, you will need to convert the file into a format that is used by the Trodes suite. This means that a proper header needs to be appended to the beginning of the file that contains information about the contents. There are two ways to do this.

- 1) If you do not need to combine the data with a simultaneous environmental recording from the MCU and ECU, then the helper program (included in the Trodes software suite) called "sdtorec" will simply add the desired workspace info to the output file. From the command line, use the following syntax:

```
sdtorec -sd [SDRECORDING.dat] -numchan [NUMCHANNELS] -mergeconf [WORKSPACE.trodesconf]
```

Here is an example for the following setup:

- 1) 32 channel headstage with 9-axis sensor included
- 2) No ECU or MCU data to merge with SD log

```
PATH/TO/TRODES/sdtorec -sd /PATH/TO/RECORDING/FILENAME.dat -numchan 32 -mergeconf /  
PATH/TO/WORKSPACES/32_Singles_NoECU_Sensors.trodesconf
```

2) If you need to combine the data with a simultaneous environmental recording from the MCU and ECU, then the helper program (included in the Trodes software suite) called “mergesdrecording” will merge the neural recording from the SD card with the environmental recording taken using Trodes. From the command line, use the following syntax:

```
mergesdrecording -rec [ENVIRONMENTALRECORDING.rec] -sd [SDRECORDING] -numchan  
[NUMCHANNELS] -mergeconf [WORKSPACE.trodesconf]
```

Here is an example for the following setup:

- 1) 128 channel headstage with 9-axis sensor and RF sync receiver included
- 2) ECU and MCU data to merge with SD log

```
PATH/TO/TRODES/mergesdrecording -rec PATH/TO/ECU/RECORDING/  
myRecording.rec -sd PATH/TO/RECORDING/sdFile.dat -numchan 128  
-mergeconf 128_Tetrodes_ECU_Sensors.trodesconf
```