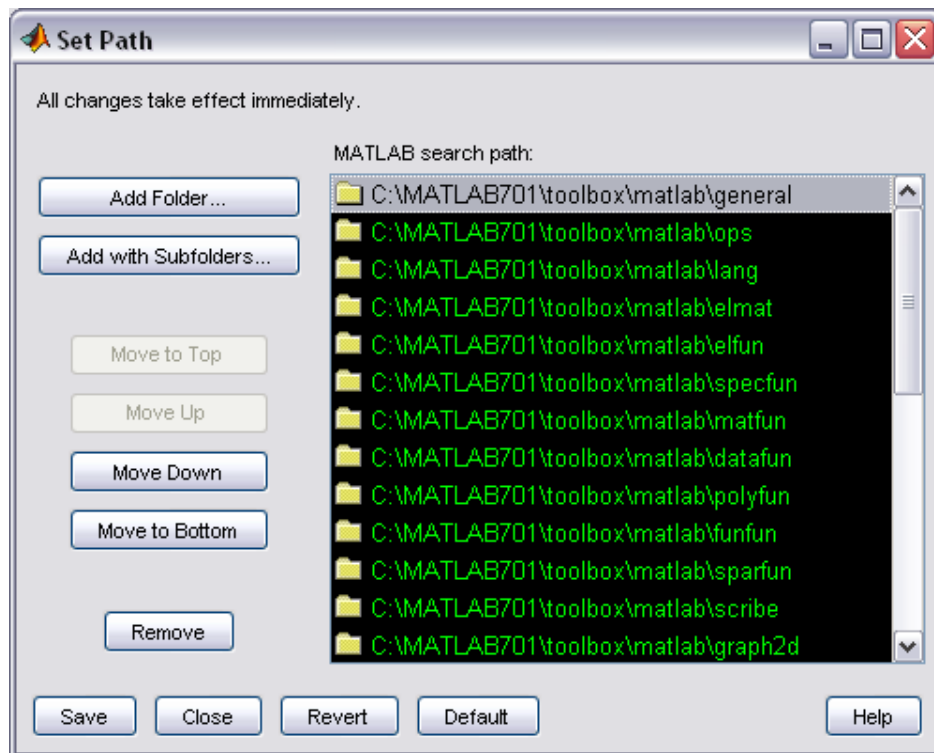


Overview

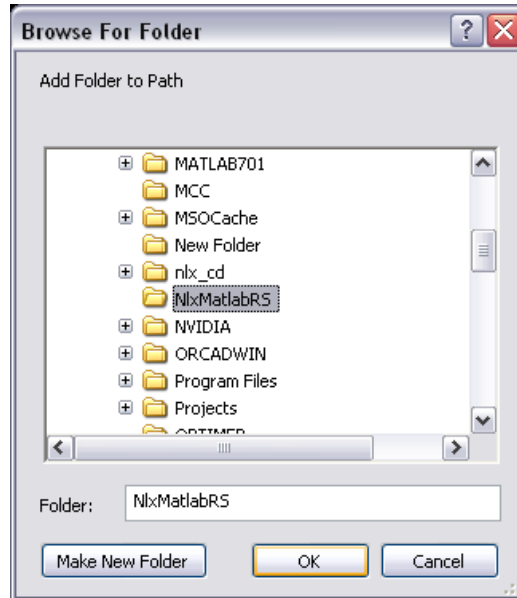
The Matlab Read Selector utility is designed for importing recorded Neuralynx files into Matlab variables. This utility is a front end for the Neuralynx Matlab Import scripts that can be executed from within Matlab. Documentation for the import scripts can be found in the individual .M files. Type "help <filename>" without the quotes at the Matlab prompt (where <filename> is the .M file you are interested in) to read the script documentation.

Installation

After downloading the most recent version of the Matlab Read Selector from the Neuralynx website (www.neuralynx.com), unzip it to any directory on your computer. **NOTE:** If you are also installing Matlab, you will need to reboot your PC before setting up Matlab Read Selector. In order for Matlab Read Selector to operate properly, there cannot be any spaces in the path to the executable. Make a new directory `C:\WlxMatlabRS` and copy all the files contained in the downloaded zip file to that directory. Next, open up Matlab. Under the *File* menu, select *Set Path...*, and the following dialog should appear:



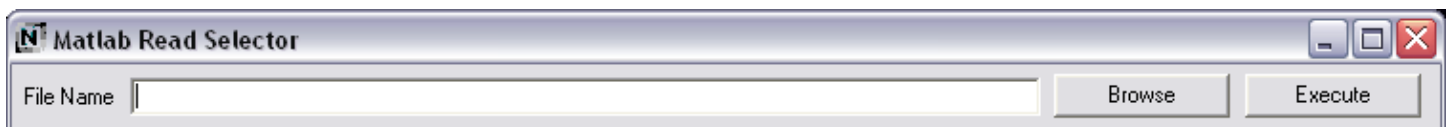
Click on *Add Folder...* and browse to the *C:\NlxMatlabRS* directory we moved everything into earlier.



C:\NlxMatlabRS should now be listed in the *MATLAB search path:* listing. Click on *Save* and then *Close* to save these changes. To verify that the changes were made, restart Matlab and type “help Mat2NlxCSC”, without the quotes, at the Matlab prompt. You should see the help for the Mat2NlxCSC command displayed in the Matlab session window.

Using the Read Selector Utility

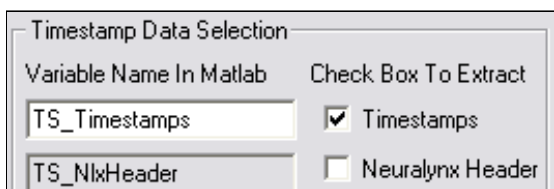
In the *C:\NlxMatlabRS* directory, double-click on the *MatlabReadSelector.exe* file. You should see the following window:



Either type the full path of the file you wish to open, or click the *Browse* button to find the file on your computer. Click *Execute* to begin file import, there will be a short delay while a Matlab command window is opened. The Matlab Read Selector will then open an import dialog. This dialog will vary depending on the type of file you wish to import into Matlab. Matlab Read Selector is capable of importing all Neuralynx datafile formats (NCS, NSE, NTT, NST, NEV, NTS, NVT) as well as the older DAT files.

Import Dialogs

There are two sections to every import dialog: *Data Selection* and *Timestamp Bounds*. The *Data Selection* values will change for each data file type.



Data Selection: By default, no variables are selected to be imported into Matlab. Checking the box next to the data name will select that data for import into Matlab. After selecting data for import, you will be able to change the default Matlab variable name if desired.

Optional Parameters - Timestamp Bounds

☒ Use Timestamp Bounds

MinimumTimestamp Bound

MaximumTimestamp Bound

Timestamp Bounds: By default, the *Use Timestamp Bounds* box is unchecked and the *Minimum* and *Maximum Timestamp Bound* input boxes are greyed out. This will cause the Matlab Read Selector to import all records contained in your selected file. If you are only interested in importing a section of this file, you can specify the timestamp bounds (in microseconds) here.

The different Import Dialogs are as follows:

Timestamp Dialog

Timestamp Data Selection

Variable Name In Matlab	Check Box To Extract
TS_Timestamps	<input type="checkbox"/> Timestamps
TS_NlxHeader	<input type="checkbox"/> Neuralynx Header

Optional Parameters - Timestamp Bounds

☐ Use Timestamp Bounds

MinimumTimestamp Bound

MaximumTimestamp Bound

OK Cancel

Timestamp Dialog: This dialog is shown when a Neuralynx Timestamp file (NTS, DAT) is selected for import into Matlab.

Data Selections

- **Timestamps:** Extracts just the timestamps for each record into a 1xN array where N is the number of records.
- **Neuralynx Header:** Extracts all the file header information as strings into a Cell.

Spike Channel Dialog

Spike Channel Type

Spike Channel Data Selection

Variable Name In Matlab	Check Box To Extract
SE_Timestamps	<input type="checkbox"/> Timestamps
SE_ScNumbers	<input type="checkbox"/> SC Numbers
SE_CellNumbers	<input type="checkbox"/> Cell Numbers
SE_Params	<input type="checkbox"/> Parameters
SE_DataPoints	<input type="checkbox"/> Data Points
SE_NlxHeader	<input type="checkbox"/> Neuralynx Header

Optional Parameters - Timestamp Bounds

☐ Use Timestamp Bounds

MinimumTimestamp Bound

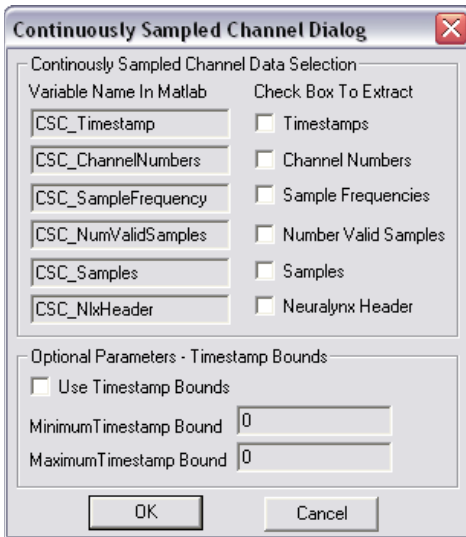
MaximumTimestamp Bound

OK Cancel

Spike Channel Dialog: This dialog is shown when any Neuralynx Spike Channel file (NSE, NST, NTT, DAT) is selected for import into Matlab. The image to the left shows a Single Electrode (NSE) import dialog. This dialog will look identical for all spike channel types, with the exception that *Spike Channel Type* and the default prefix on all Matlab variables will correspond to the type of spike channel selected.

Data Selections:

- **Timestamps:** Extracts just the timestamps for each record into a 1xN array, where N is the number of records.
- **SC Numbers:** The number of the spike channel that you are extracting based on the order they are created in your config file. This is a 0 based scalar value.
- **Cell Numbers:** The classified cell number for each spike record (if defined, otherwise they are all 0). This is a 1xN array, where N is the number of records.
- **Parameters:** (aka Features) There are eight parameters available for definition in Cheetah (i.e. Energy, Peak, Valley) The order of the eight values is determined by how the parameters are defined in your config file. This is a 8xN array, where N is the number of records.
- **Data Points:** The actual waveform data for each spike record in A/D counts. This is a 32xCxN matrix, where C is the electrode count for the spike channel (TT = 4, ST = 2, SE = 1) and N is the number of records.
- **Neuralynx Header:** Extracts all the file header information as strings into a Cell.



Continuously Sampled Channel Dialog: This dialog is shown when any Neuralynx Continuously Sampled file (NCS, DAT) is selected for import into Matlab.

Data Selections:

- **Timestamps:** Extracts just the timestamps for each record into a 1xN array, where N is the number of records.
- **Channel Numbers:** The number of the continuously sampled channel that you are extracting based on the order they are created in your config file. This is a 0 based scalar value.
- **Sample Frequencies:** The sampling rate for each 512 point CSC record. This is a 1xN array, where N is the number of records. This is generally the same value for all records. The value may be slightly off due to rounding.
- **Number Valid Samples:** This is the number of valid samples for each record, in case a partial CSC record should occur. This is generally 512 for every record, and is a 1xN array, where N is the number of records.
- **Samples:** The actual waveform data in A/D counts. This is a 512xN matrix, where N is the number of records.
- **Neuralynx Header:** Extracts all the file header information as strings into a Cell.

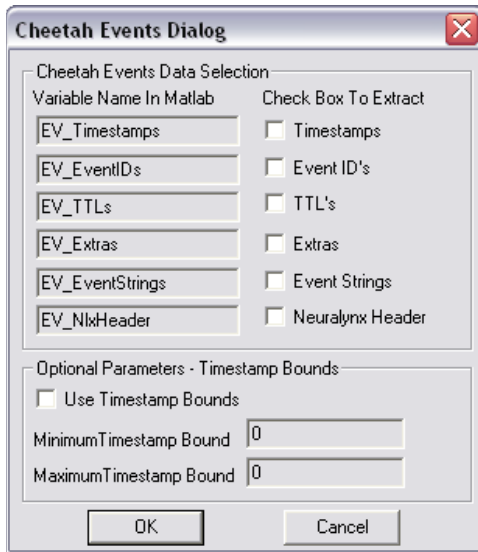


Video Tracker Dialog: This dialog is shown when any Neuralynx Video Tracker file (NVT, DAT) is selected for import into Matlab.

Data Selections:

- **Timestamps:** Extracts just the timestamps for each record into a 1xN array where N is the number of records.
- **Extracted X:** The X coordinate (in pixels) for the computed center point of the headstage. This is a 1xN array, where N is the number of records.
- **Extracted Y:** The Y coordinate (in pixels) for the computed center point of the headstage. This is a 1xN array, where N is the number of records.
- **Extracted Angle:** This value is mainly for debug purposes. However, after using the Video Tracker Center Position Modifier utility, it will change this value to a valid extracted angle for the HS-54 only. The value will be the angle that the animal is facing (in degrees), relative to the camera. This is a 1xN array, where N is the number of records.
- **Target X Position:** This is the X coordinate (in pixels) of all targets found in a VT record. This is a 50xN matrix, where N is the number of records. Not all 50 targets will necessarily have valid data on every record and the number of targets can change from record to record.
- **Target Y Position:** This is the Y coordinate (in pixels) of all targets found in a VT record. This is a 50xN matrix, where N is the number of records. Not all 50 targets will necessarily have valid data on every record and the number of targets can change from record to record.
- **Target Color:** This is the extracted color of all targets found in a VT record. This is a 50xN matrix, where N is the number of records. Not all 50 targets will necessarily have valid data on every record and the number of targets can change from record to record. Possible values are C (Cyan), M (Magenta), Y (Yellow), R (Red), G (Green), and B (Blue).
- **Points:** This contains the bitfield (defined in the *Video Tracker User's Guide*) information for each VT record. This is a 400xN matrix, where N is the number of records.
- **Neuralynx Header:** Extracts all the file header information as strings into a Cell.

Cell.



Events Dialog: This dialog is shown when any Neuralynx Events file (NEV, DAT) is selected for import into Matlab.

Data Selections:

- **Timestamps:** Extracts just the timestamps for each record into a 1xN array where N is the number of records.
- **Event ID's:** An integer value determined by where the event originated. Possible values are: 0 (Reserved), 1 (DT3010 board 1), 2 (DT3010 board 2), 4 (Keyboard), 5 (default config file ID, can be overridden), 6 (zoned video), 10 (optional digital input), 17 (additional I/O board), 119 (acquisition hardware). This is a 1xN array, where N is the number of records.
- **TTL's:** Integer value representing the TTL value for each record. This is a 1xN array, where N is the number of records.
- **Extras:** Normally 0. Only used for special TTL hardware.
- **Event Strings:** The string, if any is defined, associated with each event record. This is a 1xN cell of strings, where N is the number of records.
- **Neuralynx Header:** Extracts all the file header information as strings into a Cell.

After selecting all data, and optionally changing any variable names or timestamp bounds, simply click **OK** to import data into Matlab. Clicking **Cancel** will not import any data and return you to the file selection dialog. Upon successful import of data, you should see the following:



You can verify that the data was indeed imported into Matlab by typing "who" (without the quotes) at the Matlab command prompt. You should then see a listing of all variables you selected for importing.

```
>> who

Your variables are:

TS_Timestamps
>> |
```

All existing variable names will be overwritten during import (i.e. if a variable named EV_TTLs exists in Matlab from a previous event file import, and you import TTL's from a different event file using the default variable name, the old EV_TTLs value will be overwritten with the new data.)