

Description update, 27.10.2017

Added an additional type of song detection. Selection of song detection type is done at the beginning of batch.m and GetWav.m files:

```
Param.SongDetectionType = 0;    %0 - classical for zebra finch
                                %harmonics+amplitude
                                %1 - only harmonics using autocorrelation,
                                %good for marmosets
```

Two scripts Datalogger4ChConverter_ErrInsensitiveSound.m and Convert_4Ch_to_2Ch.m are converted to functions.

The first function is compiled in MEX file under Windows (extension mexw64). This accelerates its execution 4x. The total acceleration in comparison with the previous version in the mode without detection of vocalization is 2x approximately. The MEX file has been compiled in Matlab R2016a. The compiled MEX file should run in this and following Matlab releases under Windows. If the script should be used in earlier Matlab versions, or under Linux or Mac OS, the MEX file should be generated de-novo using "MATLAB Coder" (in APPS toolbar).

Description update, 18.09.2016

The main Matlab file batch.m has been converted to a function with the name GetWav().

Function GetWav without parameters have identical functionality with the old batch.m, but default setting of parameters in the structure Param changed. In particular, the following parameters were changed:

```
Param.LVDFile = false; %was true
Param.NFiles = 1; %was 12; number of files in which the record can be split
                    for convenience of further processing (for "full record" mode only)
```

When "LVDFile" is false, no LVD files are generated.
The value "NFiles" determines the number of output files for "full record" setting.

The function GetWav can be called with the following parameters

GetWav('C:\Test\MyData\MyFile.dat') - converts the specified file to MyFile.wav placed in the same directory C:\Test\MyData.

GetWav('C:\Test\MyData\MyFile.dat',3) - converts the specified file to three files [MyFile.wav MyFile-00002.wav MyFile-00003.wav] of approximately equal size with sequential pieces of data, placed in the same directory C:\Test\MyData. Instead of '3' any integer number above zero can be used.

GetWav('C:\Test\MyData\MyFile.dat',3,'C:\Test\MyDataWav') - the same as before, but newly generated files will be placed in the directory 'C:\Test\MyDataWav'. If this directory does not exist, it will be created.

GetWav('C:\Test\MyData\MyFile.dat',3,'C:\Test\MyDataWav',40,80) - the same as before, but the microphone output will be amplified 40x, and the accelerometer output - 80x. The default amplifications are 80, 80. Scaling is introduced to increase loudness of WAV files.

```
GetWav('C:\Test\MyData\MyFile.dat',3,'C:\Test\MyDataWav',40,80,RecStart) -
    the same as before, but with specified start of the record. RecStart
    is a DateTime value in standard Matlab format, i.e.
    RecStart = datenum([2013 12 13 07 00 00]);
```

If some parameters should not be changed, one can put an empty arrays at their places. For instance, if one needs to have proper date and time of WAV files like they were recorded in real time, the record start time should be specified as:

```
RecStart = datenum([2013 12 13 07 00 00]);
GetWav('C:\Test\MyData\MyFile.dat',[[],[],[],[],[],RecStart)
```

Description update, 10.05.2015

In case if files produced by National Instruments-based recorder system are not generated, the original code given in Supplementary software of our Nature Methods article does not work. To permit to use our code for vocalization extraction exclusively from the Backpack data, the code has been updated.

Additionally, possibility of generation of standard WAV files has been added.

The following additional parameters appeared at the beginning of batch.m file:

```
Param.WavFile = true; %wav file will be generated
    Param.WAVCoeff = [80 80]; %This is to increase loudness 80x for better
        WAV hearing, [microphone accelerometer]
Param.Synchronization = false; %no synchronization
    Param.SynchronizationTime = datenum([2013 12 13 07 00 00]);
        %Format: Year, Month, Day, Hour, Minute, Second;
        is used when Synchronization = false; real start is unknown
    Param.AnimalName = 'g2k8'; %is used when Synchronization = false;
        animal name can't be taken from NI LVD
```

The first parameter "WavFile" determines whether additional WAV files are generated or not. LVD files are always generated. The generated WAV file has two channels: backpack microphone and accelerometer. The sampling rate of WAV file is identical to sampling rate of LVD file. I.e. it can be 19200 or 32000 Hz. The first sampling rate is the logger default sampling rate and is recommended if your sound card is capable to play files with this sampling rate (otherwise select 32000 Hz that is more standard).

The second parameter "WAVCoeff" determines coefficients of amplification for two channels. The original Backpack record has different from standard 16-bit WAV record scale. Thus, to get normal good loudness one has to scale Backpack record 80x approximately. This parameter determines this scaling coefficient. If your record has another loudness, there may be a need to change these scaling coefficients. If WavFile=false, WAVCoeff has no influence

The third parameter "Synchronization" determines whether National Instruments files are used for synchronization. If these files are absent, this parameter should be "false". If synchronization is not used, the format of output LVD files does not change and unavailable data fields are filled with corresponding Backpack data. Instead of wall microphone channel and playback channel the backpack microphone channel is placed, instead of

computer synchronization channel the Backpack synchronization channel is placed.

The fourth parameter "SynchronizationTime" is used only when Synchronization is false. You should put date and time of the record start to have proper time in generated LVD and WAV files.

The fifth parameter "AnimalName" is also used only when Synchronization is false. In this case animal name can't be taken from National Instruments files and should be specified here explicitly to put it in the names of generated files.