BioRadio Software Development Kit
MATLAB® Driver Guide

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The BioRadio Software Development Kit (SDK) MATLAB® driver provides several functions for integrating BioRadio control and data acquisition into MATLAB code.

MATLAB Compatibility

This version of the BioRadio driver is designed to work with MATLAB versions 6.5 (R13) and higher, but ***if you are using MATLAB version 6.5***, you may need to download a software update from the MathWorks website to use the driver:

`http://www.mathworks.com/nn_ppsol`

The update allows MATLAB to make function calls from dynamic linked library (DLL) files.

Included Files

Along with the documentation you're reading, this SDK package contains the driver files `BioRadio150.DLL` and `BioRadio150.h`, and eight MATLAB M-files. All of these files should be saved to a directory on your computer.

Intro to the Functions

Each included M-file defines a function used to control the BioRadio. The functions are named as follows and described below.

```
BioRadio150_Load
BioRadio150_Start
BioRadio150_Program
BioRadio150_Ping
BioRadio150_Read
BioRadio150_Stop
BioRadio150_Unload

BioRadio150_Test
```

With a few exceptions, particularly `BioRadio150_Test`, these functions are usually invoked in an order similar to the one listed; the following function descriptions are arranged likewise.

More Help

Documentation is also included in comments in the M-Files, preceding and in-line with the code. This documentation supports MATLAB's **`help`** function, so as to be accessible from the MATLAB command line by typing, for example, **`help BioRadio150_Load`**.

Function Descriptions

BioRadio150_Load

Calling `BioRadio150_Load` is the first step in communicating with the BioRadio. `BioRadio150_Load` loads the BioRadio software interface, and prepares a few necessary data structures.

Inputs:

- `pathToDllDirectory`: The path string of the directory containing BioRadio150.DLL and BioRadio150.h
- `useLegacyComputerUnit`: Indicates whether you are using a legacy CleveMed Computer Unit. If so, set this argument to 1. Otherwise, set it to 0.

BioRadio150_Start

Once loading has been accomplished, calling `BioRadio150_Start` will initiate data acquisition.

Prerequisite calls:

`BioRadio150_Load`

Inputs:

- `portName`: String name of COM port to which the BioRadio is currently connected (*ex.*, '`COM4`')
- `programDevice`: Boolean (`0`: false, `1`: true) decision on whether the device configuration should be programmed to the file whose path string is the next parameter. If false, the device's current configuration will be acquired instead.
- `pathToConfigFile`: If the previous parameter (`programDevice`) is true, this parameter must be provided; a full-path string to a valid BioRadio 150 configuration file (*ex.*, '`C:\CleveMed\CleveLabs\ConfigFilesLabECGI.ini`')

BioRadio150_Ping

`BioRadio150_Ping` retrieves from the User Unit, and populates the software object with, the BioRadio's current device configuration.

This function is called by `BioRadio150_Start` if `_Start` is provided `false` for its `programDevice` parameter.

Prerequisite calls:

`BioRadio150_Load`
`BioRadio150_Start`

BioRadio150_Program

`BioRadio150_Program` programs the User Unit to, and populates the software object with, the device configuration specified in the file at the path provided.

This function is called by `BioRadio150_Start` if `_Start` is provided `true` for its `programDevice` parameter.

Prerequisite calls:

`BioRadio150_Load`
`BioRadio150_Start`

Inputs:

- `pathToConfigFile`: The path string to a valid device configuration file.

`BioRadio150_Read`

While data is being acquired, `BioRadio150_Read` retrieves, and returns as output, BioRadio data waiting at the computer's serial port.

Prerequisite calls:

```
BioRadio150_Load
BioRadio150_Start
```

Outputs:

- The function returns a two-dimensional array, with columns corresponding to acquisition channels, and each row a collected data point.

`BioRadio150_Stop`

`BioRadio150_Stop` terminates acquisition and communication with the BioRadio.

Prerequisite calls:

```
BioRadio150_Load
BioRadio150_Start
```

`BioRadio150_Unload`

`BioRadio150_Unload` removes BioRadio configuration and execution information from MATLAB's memory space.

Prerequisite calls:

```
BioRadio150_Load
```

`BioRadio150_Test`

`BioRadio150_Test` has been provided as an example MATLAB program illustrating usage of the previously described functions.

`BioRadio150_Test` initiates communication with the BioRadio, then repeatedly collects and writes to file received data. After iterations are complete, it closes communication and cleans up after itself.

Note on Data Collection Interval

When beginning to customize `BioRadio150_Test`, or write original applications using the BioRadio, a timing structure is suggested to control the rate at which data is collected from the serial port. The port buffer is of finite size, and if data is not collected sufficiently often, the port will overflow and data will be lost. If data is collected too quickly, though, processing resources will be wasted. Collecting data every 100ms (.1 seconds) is a reliable interval.